JAS. L. JACKSON & BRO.

NEW YORK.

Descriptive Price List

AND

Strength of Materials,

WITH PRACTICAL ILLUSTRATIONS OF

[illegible] BUILDINGS.

JAMES L. JACKSON & BROTHER,

IRON WORKS,

East 28th St., 2d Avenue and East 29th St.

Office, 315 East 28th Street, New York.

DESCRIPTIVE PRICE LIST

AND

STRENGTH OF MATERIALS,

WITH PARTIAL ILLUSTRATIONS

OF

IRON WORK FOR BUILDINGS.

Compiled from 1871 to 1873,

(SEE NEXT PAGE.)

15.11

NEW YORK :

E. S. Dodge & Co., Steam Book and Job Printers,

No. 12 WARREN STREET.

1873

This book has been compiled from the years 1871 to 1873, inclusive, and, during that time, many changes have been made in the costs of materials and labor, and it will be requisite to be guided in prices by a supplementary sheet, which will be furnished once in every six months.

THE following pages have been written at various times, during such brief intervals as could be spared from every-day pursuits. It has been my object in making up this edition to present, in as condensed a form as possible, all the determinations upon the strength of materials and cost of same, together with the various articles of iron work which are manufactured by us, used in the construction of modern buildings, fire-proof and otherwise. The design has been to make the book a ready reference for the architect and builder, without, as usual, wading through a mass of scientific research. The Tables of Round Columns, worked out at great labor, and giving over 2,300 different dimensions, will alone render the book of value. The rule by which these calculations were made has been inserted in the remarks preceding the table of safe weights, in order that other sizes might be worked out.

The increasing preference for Iron Work in architectural structures, in this country, is a feature worthy of note in the history of modern practical science. During the last six years—since the termination of the war—this subject has received a most rapid development, particularly in the city of New York. The use of iron for fronts as well as for the interior of buildings, is now made not only on a scale of greater magnitude, but with greater economy, and at the same time, with much more pleasing architectural effect, than ever before. Such an apparent anomaly is due partially to the peculiar capacity of iron for being shaped into such dimensions and forms as shall meet the requirements of the best architectural effect, as well as the valuable property of its great inherent strength. With skill and taste added to the natural advantages which this material affords us, there is destined to be a still more rapid advance in the introduction and use of iron for building purposes.

P. H. JACKSON.

JAMES L. JACKSON & BRO.'S

IRON WORKS,

28th Street, 2d Ave. & 29th Street, New York.

ROUND COLUMNS.

The knowledge of the strength of Cast Iron Columns was principally obtained from the experiments of Mr. Eaton Hodgkinson in the year 1840. These were very numerous, and, to a certain degree, comprehensive, having embraced over two hundred examples; and their general test shows a degree of uniformity worthy of note. This knowledge in conjunction with the investigations of Euler, Dr. Young and others, has led to the general adoption of a standard by all authors of works on engineering science, known as Hodgkinson's Rule for computing the breaking weight of Round Cast Iron Columns, either solid or hollow.

As deduced from these experiments it was found that where cylindrical Cast Iron Columns were shorter than thirty external diameters, the weight required to break them by bending is so great that the crushing force becomes sensible, and the column yields to the combined effects of the forces. But in a long column, (where the length exceeds thirty external diameters,) although the pressure contributes to break it by crushing as well as by flexure or bending, yet the column yields from bending with a weight which is insufficient to sensibly affect it by crushing alone. It was found when the pressure on the column exceeded one-fourth of the breaking weight, that a change or derangement of the metal took place. Therefore one-fifth the crushing weight, (to which the tables of extreme safe loads in this book have been computed,) is as great a pressure as can be put upon Cast Iron Columns, without having their ultimate strength decreased by incipient crushing.

In some of the experiments on Hollow Cylindrical Columns, by Hodgkinson, it was observed that at the place of fracture the metal was much thicker on one side than on the other, caused by the shifting of the core which forms the hollow of the column. So much was this the case that in more than one instance the thickness of metal on one side was more than double the thickness of that on the other. It would seem reasonable to expect that this would materially weaken the column, but such was generally found not to be the case. The rounded

or convex side usually agreed with the greatest thickness of metal. These remarkable results are to be reconciled in this manner. The column is set up perpendicularly, with the ends finished in planes at right angles to its axis. Being equally loaded, the side having the least amount of metal will be the most compressed, and the other side seemingly elongated; or so that the convexity is on the thickest side. The convex side is subject to a tensile force, and the concave side to a crushing force; and as the resistance of Cast Iron to compression is as $6\frac{1}{2}$ to 1 of extension, the thin side, subject to compression, would permit of great reduction and still be equal in strength to the thicker side, subject to rupture. But, as a general conclusion, I consider it highly dangerous to entertain this as a fact, and would recommend the condemnation of the use of columns not reasonably straight, and of a uniform thickness, where they are to be loaded up to the capacity mentioned as safe weights in the tables. I was doubtful as to the propriety of introducing here any mention of these experiments, but, on reflection, considered it proper to do so, with the observations; as my attention has been called on several occasions to the examination of bent or curved Columns.

In justice to the use of Iron Columns, I should say that they are not generally loaded up to the limit of safe weight, as is customary in the use of wooden posts.

Formula for finding the breaking weight of hollow cylindrical Cast Iron Columns, with the ends flat and finished in planes at right angles to their axes. When the length exceeds thirty external diameters.

Constant 44.34 multiplied by the quotient of the difference between the external diameter raised to the power $3.^{55}$ and the internal diameter raised to the power $3.^{55}$, divided by the length in feet raised to the power $1.^{7}$. The product will be the breaking weight in tons.

Formula for finding the breaking weight when the length is less than thirty and more than eight external diameters.

Multiply the crushing force of the material—41 tons, by the sectional area of the column, and multiply the product by the breaking weight of the column found as for over thirty external diameters in length; and divide the result by $\frac{3}{4}$ of the product of the crushing force of material and sectional area of column plus the breaking weight of column found as for over thirty diameters. The quotient will be the breaking weight in tons. When a column is less than eight external diameters in length its full crushing strength comes into play.

In my previous edition of this work, in the table of safe weights to be sustained by hollow cylindrical Cast Iron Columns of various thicknesses and lengths, such as are embraced in this, greater allowance of surplus strength was made for defects in castings, &c., in proportion to the actual breaking weight by rule, than necessity required. In several cases which have come to my knowledge this has worked decidedly to the disadvantage of the use of iron columns, owing to the substitution of wooden posts. The weights sustained by these wooden posts were much nearer their crushing strength than my table of safe weights for Iron Columns would indicate as proper to use. Therefore I have marked upon these tables the rate of the safe weight to be sustained at one-fifth the breaking weight.

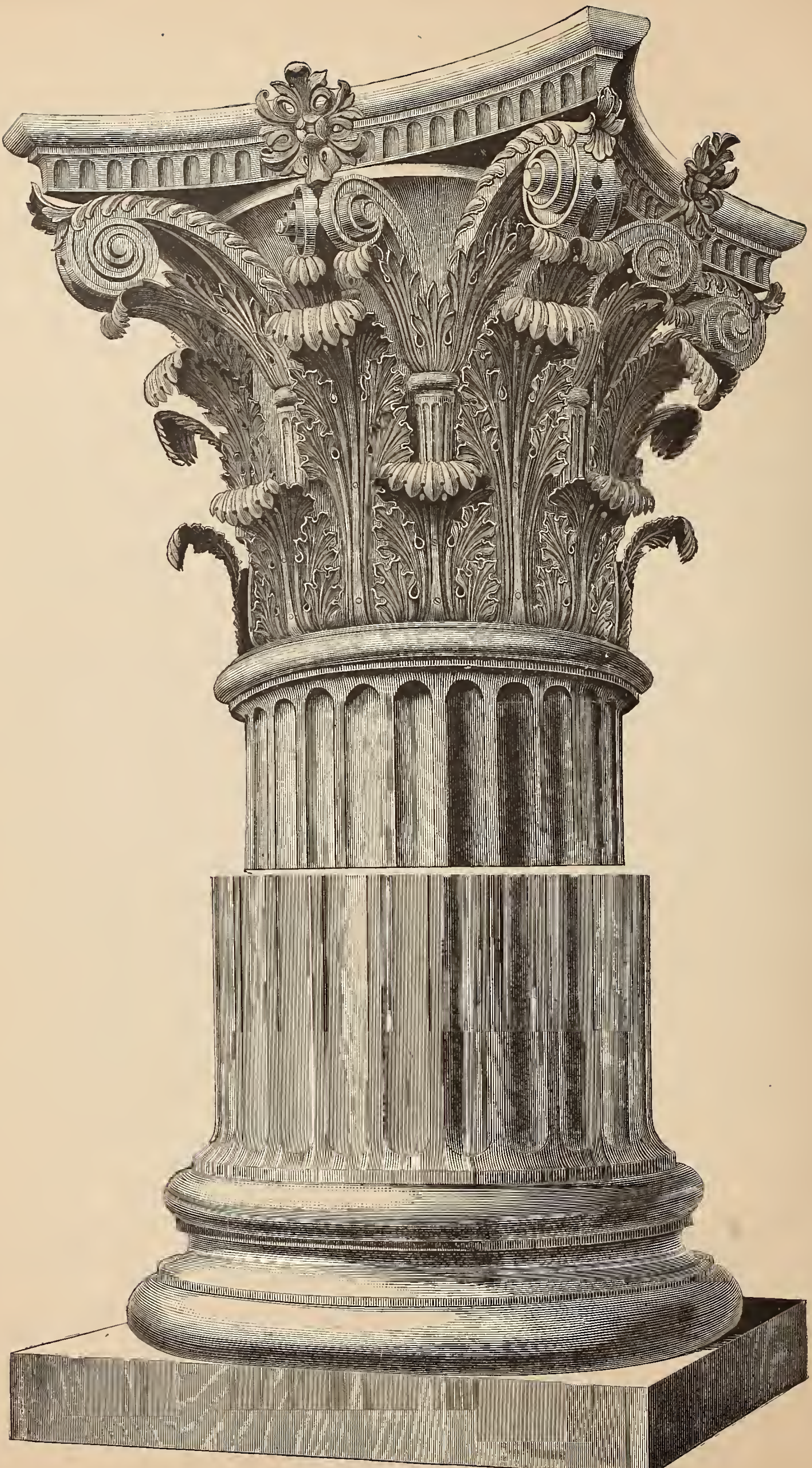
It is a more common practice than otherwise, with some founders, to make columns of greater thickness at the ends, where it is observable, than at any other part. This is done to economize in the metal, at the same time showing a compliance with the requirements of the building specification, and, so far as observation goes, they really seem so to be.

It is obvious, therefore, that in these tables of safe weights which columns will sustain, it will not do to take them as a guide, unless the columns are made of an uniform thickness of metal throughout, of good metal, reasonably perfect castings, with cores made in one piece, castings straight, the ends turned off in a lathe true in planes at right angles with their axis, and set up perpendicularly in the building with level cap and base plates.

Mr. Hodgkinson, in his experiments, found that columns with rounded ends would sustain but about *one-third* the amount of those with flat ends, carefully fitted with their ends at right angles to the axis of the column. In the ordinary mode of chopping off (cutting with a chisel) the ends of a column in an unfinished state, the inequalities of the bearing surfaces cause the weight to rest on a few points on the ends, and it is almost an impossibility to have the ends at right angles with the axis except by the greatest care—more than is ever exercised in chipping. The safe weight in such cases is considered to be about *two-thirds* of one turned true, as described in the tables.

In computing the weight to be sustained by a column, it is not proper to estimate the weight appropriate to that particular use for which it is intended; but the weight should be estimated for any use to which the building may be applied, with full allowance for floors, and the weights to be placed thereon. It is not safe to take the average weight sustained on each column, as some columns will have more or less on them than the average, and will be loaded more on one side than on the other; besides they are subject to concussion from bodies falling on a floor above, or may receive a lateral blow from goods falling against them in transmission. It would be proper that an addition of at least one-fifth should be made to the average weight to be sustained for excess.

Great allowance should also be made for columns that are subject to vibrations caused by machinery, as well as those to support the floors of drill rooms.



ROUND COLUMNS.

Weights in tons, of 2,000 pounds, which Hollow Round Iron Columns will sustain with safety, of the various thicknesses; with the ends turned off true at planes with their axis, with level cap and base plates, cast separate from the columns, and otherwise made in every particular as specified in the foregoing statement.

COLUMN 8 FEET LONG.

External Diameter.	$\frac{3}{8}$ in.	$\frac{1}{2}$ in.	$\frac{5}{8}$ in.	$\frac{3}{4}$ in.	$\frac{7}{8}$ in.	1 in.	$1\frac{1}{8}$ in.	$1\frac{1}{4}$ in.	$1\frac{3}{8}$ in.	$1\frac{1}{2}$ in.	$1\frac{5}{8}$ in.	$1\frac{3}{4}$ in.	2 in.
4 inches.	15	19	22	25	27	29	30						
5 "		30	35½	41	45½	49½	53	55½					
6 "		42	51	59	66	73	78½	84	89	93	96½		
7 "			67	78	88	98	106½	115	122	129	135	141	150
8 "			83	97½	111	124	136	147	157	167	176	185	199½
9 "			100	118	134	150	165½	180	194	206½	219	230	251
10 "			117	138	158	177	196	213½	230½	246½	262	276½	303½
11 "			134	158	182	204½	226	247	267½	287	305½	323½	357
12 "			151	179	205½	231½	257	281	305	327½	349½	370½	411
13 "			168	199	229	259	287	315	342	368	393½	418	465
14 "			185	219	253	286	318	349	379	409	438	465½	519

COLUMN 9 FEET LONG.

External Diameter.	$\frac{3}{8}$ in.	$\frac{1}{2}$ in.	$\frac{5}{8}$ in.	$\frac{3}{4}$ in.	$\frac{7}{8}$ in.	1 in.	$1\frac{1}{8}$ in.	$1\frac{1}{4}$ in.	$1\frac{3}{8}$ in.	$1\frac{1}{2}$ in.	$1\frac{5}{8}$ in.	$1\frac{3}{4}$ in.	2 in.
4 inches.	13	16½	19½	22	24	25	26½	27½					
5 "		27	32	37	41	44	47	50	52	53½	55	56	
6 "		38½	46½	54	60	66	71½	76	80½	84	87	90	94½
7 "			62	72	81½	90	98	106	112½	119	124	129	138
8 "			78	91½	104	116	127	137	147	156	164	171½	185
9 "			95	111	127	142	156	169½	182	194	205	216	235
10 "			112	131	150	168½	186	203	218½	234	248	262	287
11 "			128	151½	174	195½	216	236	255	274	291	308	340
12 "			145	172	197½	222½	247	270	292½	314	335	355	393
13 "			162	192	221½	250	277	304	330	355	379	402½	447
14 "			179	213	245	277	308	338	367	395½	423	450	501

COLUMN 10 FEET LONG.

External Diameter.	$\frac{3}{8}$ in.	$\frac{1}{2}$ in.	$\frac{5}{8}$ in.	$\frac{3}{4}$ in.	$\frac{7}{8}$ in.	1 in.	$1\frac{1}{8}$ in.	$1\frac{1}{4}$ in.	$1\frac{3}{8}$ in.	$1\frac{1}{2}$ in.	$1\frac{5}{8}$ in.	$1\frac{3}{4}$ in.	2 in.
4 inches.	12	15	17	19	21	22	23	24					
5 "		24	29	33	36½	40	42	44½	46	48			
6 "		35½	43	49	55	60	65	69½	73	76	79	81½	85
7 "			57½	67	75½	83½	91	97½	104	109	114	118½	126
8 "			73	85½	97	108	118	128	137	145	152	159	171½
9 "			89½	105	120	134	147	159½	171	182	193	202½	220
10 "			107	125	143	160	176½	192	207	221	234½	247	271
11 "			123	145	166	187	206	225	243	261	277	293	323
12 "			139½	165	190	213½	236½	259	280	301	321	340	376
13 "			157	185½	213½	241	267	292½	317	341	364½	387	429
14 "			174	206	237	268	297½	326½	354½	382	408½	434	483

COLUMN 11 FEET LONG.

External Diameter.	3/8 in.	1/2 in.	5/8 in.	3/4 in.	7/8 in.	1 in.	1 1/8 in.	1 1/4 in.	1 3/8 in.	1 1/2 in.	1 5/8 in.	1 3/4 in.	2 in.
4 inches.	11½	14	16	18	19	20	20½	21					
5 "		22	26	30	33	36	38	40	42	43			
6 "		32½	39	45	50½	55	59½	63	66½	69½	72	74	77½
7 "			53	62	70	77	84	90	95½	100½	105	109	116
8 "			68½	80	91	101	110½	119	127	135	142	148	159
9 "			84½	99	113	126	138	150	161	171	181	190	206
10 "			101	118½	135½	152	167	182	196	209	222	233½	255
11 "			117	138	159	178	197	215	232	248	264	279	306
12 "			134	158½	182	205	227	248	268	288	307	325	359
13 "			151	179	205½	232	257	281	305	328	350	371	412
14 "			168	199	229	259	287	315	342	368	394	418	465

COLUMN 12 FEET LONG.

External Diameter.	3/8 in.	1/2 in.	5/8 in.	3/4 in.	7/8 in.	1 in.	1 1/8 in.	1 1/4 in.	1 3/8 in.	1 1/2 in.	1 5/8 in.	1 3/4 in.	2 in.
4 inches.	10	12	14	15	16½	17	18	18½					
5 "		20	24	27	30	32	34½	36	37½	39			
6 "		30	36	41	46	51	54½	58	61	63	66	67½	70
7 "			49½	57½	65	71½	78	83	88	93	97	100	106
8 "			64	75	85	94	103	111	119	125½	132	137½	147½
9 "			80	93	106	118½	130	141	151	161	169½	178	192½
10 "			96	112½	128½	144	158	172	185	198	209½	220½	240½
11 "			112	132	151	170	187	204	220½	236	251	265	291
12 "			129	152	174	196	217	237	256½	275	293	310	342
13 "			145	172	198	223	247	270	293	315	336	356	394½
14 "			162	192	221	250	277	304	330	355	379	403	447½
15 "			179	212½	245	277	308	338	367	395½	423	450	501
16 "			196	233	269	304	338	371½	404	436	467	497	555

COLUMN 13 FEET LONG.

External Diameter.	3/8 in.	1/2 in.	5/8 in.	3/4 in.	7/8 in.	1 in.	1 1/8 in.	1 1/4 in.	1 3/8 in.	1 1/2 in.	1 5/8 in.	1 3/4 in.	2 in.
4 inches.	8½	10½	12	13	14	15	15½	16					
5 "		20	24	27	29	31	33	34	35	36			
6 "		28	33	38	42½	46½	50	53	56	58	60	62	64
7 "			46	53½	60	66	72	77	82	86	89	92½	98
8 "			60	70	79½	88	96	104	111	117	123	128	137
9 "			75	88	100	112	122½	132½	142	151	159	167	180
10 "			91	107	122	136	150	163	175	187	198	208	227
11 "			107	126	144	162	178	194½	210	224	238	251	276
12 "			123	145½	167	188	207½	227	245	263	280	296	326
13 "			140	165½	190	214	237	259½	281	302	322	341	378
14 "			156½	185½	213½	241	267	293	318	342	365	387½	430
15 "			173½	206	237	268	297½	326	354½	382	408½	434	483½
16 "			190	226	261	295	328	360	392	422	452	481	537

COLUMN 14 FEET LONG.

External Diameter.	3/8 in.	1/2 in.	5/8 in.	3/4 in.	7/8 in.	1 in.	1 1/8 in.	1 1/4 in.	1 3/8 in.	1 1/2 in.	1 5/8 in.	1 3/4 in.	2 in.
5 inches.		18	21	23½	26	27	29	30	30½	31			
6 "		25½	30½	35	39	43	46	49	51	53	55	56½	59
7 "			43	50	56	61½	67	71½	76	79	83	86	90½
8 "			56½	66	74½	82½	90	97	103	109	114	119	127½
9 "			71	83	94½	105	115	125	133½	142	149½	156½	169
10 "			86	101	115½	129	142	154	166	177	187	196½	214
11 "			102	120	137½	154	170	185	199	213	226	239	261½
12 "			118	139	160	179½	198½	217	234	251	267	282	311
13 "			134½	159	183	205½	228	249	270	289½	309	327	361½
14 "			151	179	206	232	257	282	306	329	351	373	413½
15 "			168	199	229	259	287½	315	342	369	394	419	466
16 "			185	219	253	286	318	349	379	409	438	466	519

COLUMN 15 FEET LONG.

External Diameter.	3/8 in.	1/2 in.	5/8 in.	3/4 in.	7/8 in.	1 in.	1 1/8 in.	1 1/4 in.	1 3/8 in.	1 1/2 in.	1 5/8 in.	1 3/4 in.	2 in.
5 inches.		16	19	21	23	24½	25½	26½	27	28			
6 "		24	28	32½	36	39½	42½	45	47	49	51	52	54
7 "			40	46	52	57	62	66	70	73½	76½	79	84
8 "			53	62	70	77	84	91	96½	102	107	111	119
9 "			67	78½	89	99	109	117½	126	133	140	147	158½
10 "			84	96	109½	122	134½	146	157	167	177	186	202
11 "			97	114½	131	147	161½	176	189½	202½	215	226½	248
12 "			113	133	153	172	190	207	223½	239½	255	269	296
13 "			129	153	175½	197	218½	239	258½	277½	296	313	346
14 "			146	172½	198	223½	248	271½	294	316	337½	358	397
15 "			162	192	221½	250	277½	304	330½	356	380	404	449
16 "			179	212½	245	277	307½	338	367	395½	423	450	502

COLUMN 16 FEET LONG.

External Diameter.	3/8 in.	1/2 in.	5/8 in.	3/4 in.	7/8 in.	1 in.	1 1/8 in.	1 1/4 in.	1 3/8 in.	1 1/2 in.	1 5/8 in.	1 3/4 in.	2 in.
6 inches.		24	28½	32	36	38½	41	43	45	46	47	48	49
7 "			37	43	48½	53½	58	62	65	68½	71	73½	77½
8 "			50	58	65½	72½	79	85	90	95	100	104	111
9 "			63	74	84	93½	102	111	118	125½	132	138	149
10 "			77	91	104	116	127½	138	148½	158	167	175½	190½
11 "			93	109	125	140	154	167½	180	192½	204	215	235
12 "			108	128	146	164	181	198	213½	229	243	257	282
13 "			124	147	168½	189½	210	229	248	266	283	300	331
14 "			140½	166	191	215	238½	261	283	304	324½	344	381
15 "			157	186	214	241½	268	294	319	343	366½	389	432½
16 "			173½	206	237	268	298	327	355	382½	409	435	485

COLUMN 17 FEET LONG.

External Diameter.	3/8 in.	1/2 in.	5/8 in.	3/4 in.	7/8 in.	1 in.	1 1/8 in.	1 1/4 in.	1 3/8 in.	1 1/2 in.	1 5/8 in.	1 3/4 in.	2 in.
6 inches.		22	26	29	32	35	37	39	40	41½	42½	43	44
7 "			35	40	45	50	54	57½	61	64	66	68½	72
8 "			47	54½	61½	68	74	79½	85	89	93½	97	104
9 "			60	70	79½	88	96½	104	111½	118	124	130	140
10 "			73	86½	99	110	121	131	141	149½	158	166	180
11 "			88½	104	119	133	146½	159	171½	183	194	204	223
12 "			104	122	140	157	173½	189	204	218	232	245	269
13 "			119	141	162	182	201	220	237½	255	271	287	317
14 "			135	160	184	207	229½	251	272	292	312	330½	366
15 "			151½	179½	207	233	259	283½	307½	331	353	375	416½
16 "			168	199	229½	259	288	316	343	370	395½	420½	468

COLUMN 18 FEET LONG.

External Diameter.	3/8 in.	1/2 in.	5/8 in.	3/4 in.	7/8 in.	1 in.	1 1/8 in.	1 1/4 in.	1 3/8 in.	1 1/2 in.	1 5/8 in.	1 3/4 in.	2 in.
6 inches.													
7 "			36	41½	46	50	54	57	60	62	64	66	68
8 "			44	51	58	64	70	75	80	84	88	91	97
9 "			57	66	75	83½	91	98½	105	111½	117	122½	132
10 "			69	82	94	104½	115	124	133	142	150	157	170
11 "			84½	99	113	127	139½	152	163	174	184½	194	212
12 "			99	117	134	150	166	181	195	208½	221½	234	256½
13 "			115	135	155	174½	193	211	228	244	260	275	303
14 "			130	154	177	199	221	242	262	281	300	318	351
15 "			146½	173	199½	225	249½	273	296½	319	340½	361	401
16 "			163	193	222	251	279	305½	332	357	382	406	452

COLUMN 19 FEET LONG.

External Diameter.	3/8 in.	1/2 in.	5/8 in.	3/4 in.	7/8 in.	1 in.	1 1/8 in.	1 1/4 in.	1 3/8 in.	1 1/2 in.	1 5/8 in.	1 3/4 in.	2 in.
6 inches.													
7 "			33	38	42	46	49	52	54½	56½	58	60	62
8 "			42	48	54½	60	65½	70	75	79	82	85½	91
9 "			54	63	71	79	86	93	99	105	110½	115½	124
10 "			66	78	89	99	109	118	126½	134	142	149	161
11 "			81	95	108	121	133	145	155½	166	175½	185	201½
12 "			95	112	128	144	158½	173	186	199	211½	223	245
13 "			110	130	149	167½	185	202	218	234	249	263	290
14 "			126	148½	170½	192	212½	232½	252	270	288	305	337
15 "			141½	167	193	217	241	264	286	307	328	348	386
16 "			157½	187	215	243	269½	295½	321	345	369	392	436

COLUMN 20 FEET LONG.

External Diameter.	3/8 in.	1/2 in.	5/8 in.	3/4 in.	7/8 in.	1 in.	1 1/8 in.	1 1/4 in.	1 3/8 in.	1 1/2 in.	1 5/8 in.	1 3/4 in.	2 in.
8 inches.			39	46	51	57	62	66	70	74	77½	80½	85½
9 "			51	59½	67	75	81½	88	94	99	104	109	117
10 "			62	74	85	94	103	112	120	127½	134½	141	153
11 "			77	90	103	115	127	138	148	158	167	176	192
12 "			91	107	123	137½	152	165	178	190	202	213	233½
13 "			106	125	143	161	178	194	209½	224	239	252	278
14 "			121	143	164	185	204½	224	242	260	277	293	324
15 "			136½	161½	186	209½	232	254	276	296	316	335	372
16 "			152½	181	208	235	260½	286	310	334	356½	379	421

COLUMN 21 FEET LONG.

External Diameter.	3/8 in.	1/2 in.	5/8 in.	3/4 in.	7/8 in.	1 in.	1 1/8 in.	1 1/4 in.	1 3/8 in.	1 1/2 in.	1 5/8 in.	1 3/4 in.	2 in.
10 inches.				71	80½	90	98	106	114	121	128	134	145
11 "				86	98½	110	121	131½	141	150½	159	167½	182½
12 "				103	117½	132	145	158	170	182	193	203½	223
13 "				120	137½	154	170½	186	201	215	229	242	266
14 "				138	158	178	197	215	233	250	266	282	311
15 "				156	180	202	224	245	266	286	305	323	358
16 "				175	201	227	252	276	300	322	344½	366	406

COLUMN 22 FEET LONG.

External Diameter.	3/8 in.	1/2 in.	5/8 in.	3/4 in.	7/8 in.	1 in.	1 1/8 in.	1 1/4 in.	1 3/8 in.	1 1/2 in.	1 5/8 in.	1 3/4 in.	2 in.
10 inches.				67	77	85½	93½	101	108	115	121	127	137½
11 "				82½	94	105	115½	125	135	143½	152	160	174
12 "				98½	112½	126	139	151	163	174	185	194½	213
13 "				115	132	148	164	178½	193	206	219½	232	255
14 "				133	152	171	189½	207	224	240	256	271	299
15 "				151	173	195	206	236½	256	275	294	311	345
16 "				169	195	219½	244	267	289½	311½	333	353	392

COLUMN 23 FEET LONG.

External Diameter.	3/8 in.	1/2 in.	5/8 in.	3/4 in.	7/8 in.	1 in.	1 1/8 in.	1 1/4 in.	1 3/8 in.	1 1/2 in.	1 5/8 in.	1 3/4 in.	2 in.
10 inches.				64	73	81	89	96	103	109½	115½	121	130½
11 "				79	90	100½	110	120	129	137	145	152	166
12 "				94	108	121	133	145	156	166½	177	186	204
13 "				111	127	142	157	171½	185	198	210½	222	244
14 "				128	147	165	182½	199	215½	231	246	260½	287
15 "				145½	167	188	208½	228	247	265½	283	300	332
16 "				164	188	212	235½	258	280	301	321½	341	379

COLUMN 24 FEET LONG.

External Diameter.	3/8 in.	1/2 in.	5/8 in.	3/4 in.	7/8 in.	1 in.	1 1/8 in.	1 1/4 in.	1 3/8 in.	1 1/2 in.	1 5/8 in.	1 3/4 in.	2 in.
10 inches.				61	70	77½	85	92	98	104	110	115	124
11 "				75½	86	96	105	114½	123	131	138	145	158
12 "				91	103½	116	128	139	149½	159½	169	178	195
13 "				106½	122	137	151	165	178	190	202	213	234
14 "				123	141½	159	176	192	207½	222½	237	250½	276
15 "				140½	161½	182	201	220	238½	256	273	189	320
16 "				158	182	205½	228	249½	270½	291	311	330	366
17 "													

COLUMN 25 FEET LONG.

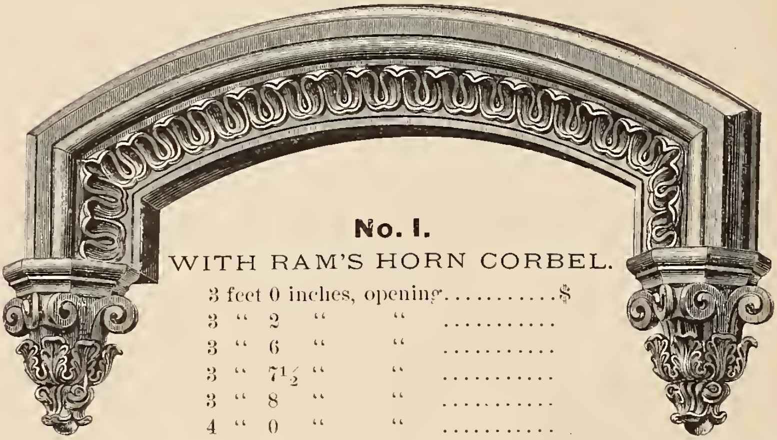
External Diameter.	3/8 in.	1/2 in.	5/8 in.	3/4 in.	7/8 in.	1 in.	1 1/8 in.	1 1/4 in.	1 3/8 in.	1 1/2 in.	1 5/8 in.	1 3/4 in.	2 in.
10 inches.				58½	66½	74	81	87½	94	99½	105	110	118
11 "				72	82	92	101	109½	117½	125	132	139	151
12 "				87	99	111	122½	133	143	153	162	171	186½
13 "				102½	117	131½	145	158	171	183	194	205	225
14 "				119	136	153	169	185	200	214	228	241	266
15 "				136	156	175½	194	212½	230	247	263	279	308½
16 "				153	176	199	220	241	261½	281	300	318½	353
17 "													

Window Lintels and Sills,

—ALSO—

DOOR LINTELS.

These average about one-third price of those cut in same manner in Brown Stone.



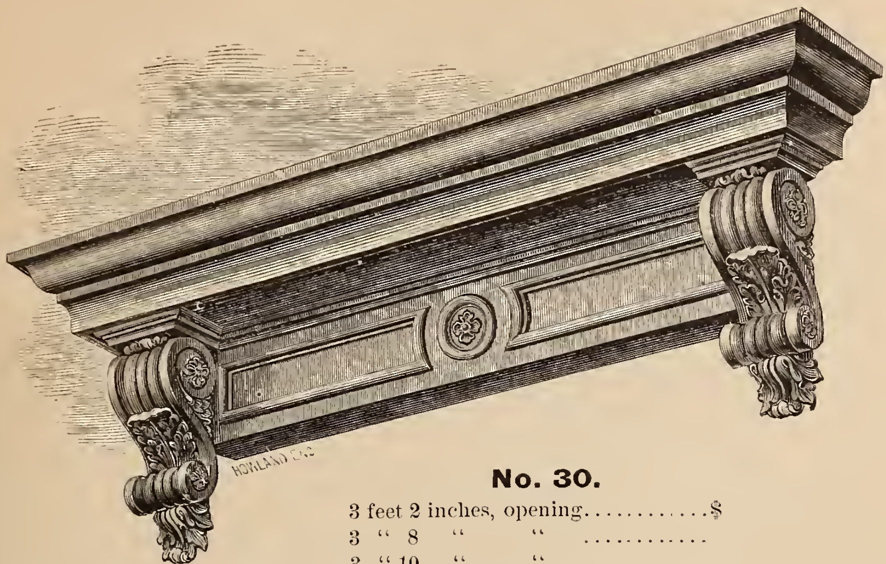
No. 1.

WITH RAM'S HORN CORBEL.

3 feet	0 inches,	opening		..........$
3 "	2	"	"	....
3 "	6	"	"	....
3 "	$7\frac{1}{2}$	"	"	....
3 "	8	"	"	....
4 "	0	"	"	....
4 "	3	"	"	....
4 "	4	"	"	....
4 "	10	"	"	....
5 "	0	"	"	....
5 "	3	"	"	....
7 "	0	"	"	....

No. 14.

3 feet	0 inches,	opening		......$
3 "	6	"	"	......
3 "	9	"	"	......
4 "	0	"	"	......
4 "	2	"	"	......
4 "	4	"	"	......
5 "	0	"	"	......

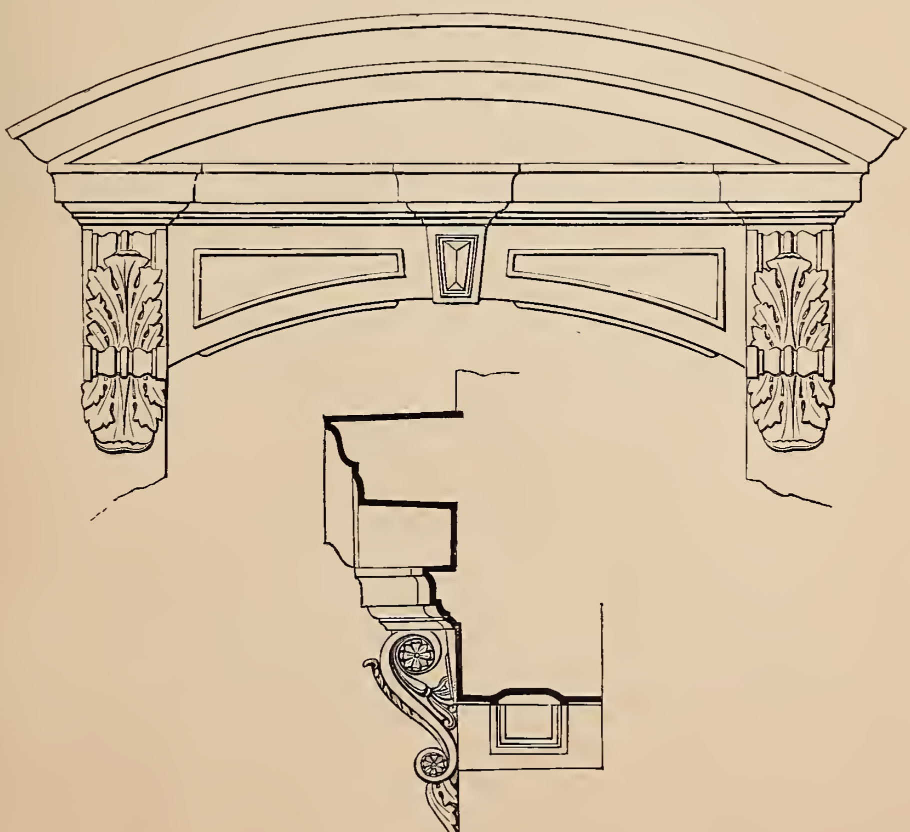


No. 30.

3 feet 2 inches, opening............$
3 " 8 " " ....
3 " 10 " " ....

No. 58.—DOOR LINTEL.

Soffit made 12 in. and 4 in. deep. 4 feet 0 inches, opening.



PRICES

OF

Window Lintels and Sills, and Door Lintels,

AS SHOWN ON DRAWINGS 3 AND 4.

No. 1.

WITH RAM'S HORN CORBEL.

	Price.
3 feet 0 inches open	$15 00
3 " 2 " "	15 50
3 " 4 " "	16 00
3 " 6 " "	16 50
3 " 7½ " "	16 75
3 " 8 " "	17 00
4 " 0 " "	17 75
4 " 3 " "	18 75
4 " 4 " "	19 00
4 " 10 " "	20 50
5 " 0 " "	21 50
5 " 2 " "	22 00
7 " 0 " "	26 00

No. 2.

WITH TRUSSES.

3 feet 6 inches open	$17 00
3 " 8 " "	17 50
4 " 0 " "	18 50
4 " 2 " "	19 00
4 " 10 " "	21 00
6 " 0 " "	24 00
6 " 2 " "	24 50

No. 3.

WITH TRUSSES.

3 feet 4 inches open	$18 00
3 " 6 " "	18 50
3 " 8 " "	19 00
3 " 9 " "	19 50
5 " 0 " "	25 00
5 " 6 " "	26 25
6 " 0 " "	27 50

No. 1.

WITH TRUSSES.

	Price.
3 feet 0 inches open	$15 50
3 " 2 " "	16 00
3 " 4 " "	16 50
3 " 6 " "	17 00
3 " 7½ " "	17 25
3 " 8 " "	17 50
4 " 0 " "	19 25
4 " 3 " "	18 25
4 " 4 " "	19 50
4 " 10 " "	21 00
5 " 0 " "	22 00
5 " 2 " "	22 75
7 " 0 " "	26 50

No. 2.

WITH RAM'S HORN CORBELS.

3 feet 6 inches open	$16 50
3 " 8 " "	17 00
4 " 0 " "	18 00
4 " 2 " "	18 50
4 " 10 " "	20 50
6 " 0 " "	23 50
6 " 2 " "	24 00

No. 3.

WITH RAM'S HORN CORBELS.

3 feet 4 inches open	$17 75
3 " 6 " "	18 00
3 " 8 " "	18 50
3 " 9 " "	18 75
5 " 0 " "	24 75
5 " 6 " "	26 00
6 " 0 " "	27 25

WINDOW LINTELS AND SILLS, AND DOOR LINTELS.

CONTINUED.

No. 4.

	PRICES.
3 feet 2 inches open	$5 75
3 " 4 " "	6 25
3 " 6 " "	6 75
4 " 0 " "	7 60
4 " 3 " "	8 25

No. 6.

These project 2 in. more from face of wall than the No. 5 Window Lintel.

3 feet 0 inches open	$8 80
3 " 2 " "	9 00
3 " 4 " "	9 38
3 " 6 " "	9 80
3 " 7 " "	9 88
4 " 0 " "	10 38
5 " 6 " "	17 00
6 " 8 " "	19 00

5 feet 6 inches and 6 feet 8 inches opening, have heavy Corbels and Key Stones in centre.

No. 8.

3 feet 4 inches open	$6 00
3 " 5 " "	6 50
3 " 6 " "	7 00
3 " 8 " "	7 85
3 " 9 " "	8 00
3 " 10 " "	8 25
4 " 0 " "	8 50
4 " 3 " "	8 75
4 " 4 " "	9 00

No. 10.

2 feet 10 inches open	$5 85
3 " 0 " "	6 00
3 " 6 " "	7 13
3 " 7 " "	7 25
3 " 8 " "	7 50
4 " 4 " "	9 12

No. 12.

These project 4 inches more from face of wall than No. 5.

3 feet 0 inches open	$14 12
3 " 5 " "	14 62
3 " 6 " "	14 75
3 " 7 " "	15 00
3 " 9 " "	15 25
4 " 0 " "	15 75

No. 5.

	PRICES.
2 feet 2 inches open	$4 40
2 " 6 " "	4 65
3 " 0 " "	4 75
3 " 2 " "	5 15
3 " 4 " "	5 60
3 " 5 " "	5 95
3 " 6 " "	6 35
3 " 7½ " "	6 50
3 " 9 " "	7 00
4 " 0 " "	7 60
4 " 2 " "	7 75
4 " 4 " "	8 00
6 " 0 " "	15 00

No. 7.

3 feet 4 inches open	$22 00
3 " 5 " "	22 50
3 " 6 " "	23 00
3 " 9 " "	24 00

No. 9.

3 feet 3 inches open	$9 00
3 " 4 " "	9 38
3 " 6 " "	9 80
3 " 7½ " "	9 88
3 " 8 " "	9 90
3 " 11 " "	10 00
4 " 0 " "	10 38
4 " 4 " "	11 20

No. 11.

3 feet 0 inches open	$16 00
3 " 2 " "	16 50
3 " 4 " "	17 00
3 " 6 " "	17 50
3 " 7½ " "	17 75
3 " 8 " "	18 00
4 " 0 " "	18 75
4 " 3 " "	19 75
4 " 4 " "	20 00
4 " 10 " "	21 50
5 " 0 " "	22 50
5 " 2 " "	23 25
7 " 0 " "	27 00

No. 12.

DOOR LINTEL.

4 feet 4 inches open	$25 00
4 " 8 " "	26 00

WINDOW LINTELS AND SILLS, AND DOOR LINTELS.

CONTINUED.

No. 14.

	Prices.
3 feet 0 inches open	$16 50
3 " 6 " "	18 00
3 " 9 " "	19 50
4 " 0 " "	20 50
4 " 2 " "	21 00
4 " 4 " "	21 50
5 " 0 " "	23 00

No. 17.

3 feet 5 inches open	$9 50
3 " 6 " "	9 75
4 " 0 " "	10 50
4 " 1 " "	10 75
4 " 2 " "	11 00

No. 20.

DOOR LINTEL, 12 inch Soffit.

Greatest Projection from Wall, 14½ in.

4 feet 6 inches open	$75 00
4 " 8 " "	76 00
5 " 0 " "	80 00
5 " 2 " "	82 00
If Pilasters are used, paneled face and sides, 10 to 11 ft. long, per pair,	74 00

No. 22.

DOOR LINTEL.

Same Pattern as Window Lintels shown on Drawing 3. Soffit 12 inches deep, and Paneled.

4 feet 4 inches open	$65 00
4 " 6 " "	67 00
4 " 8 " "	68 00
If Pilasters are used, paneled face and sides, 10 to 11 ft. long, per pair,	74 00

No. 28.

4 feet 6 inches open	$18 50

No. 31.

3 feet 0 inches open	$7 13
3 " 2 " "	7 25
3 " 4 " "	7 50
3 " 6 " "	7 80
3 " 8 " "	8 10
3 " 9 " "	8 25
3 " 10 " "	8 50
4 " 0 " "	9 00

No. 34.

3 feet 6 inches open	$5 75
4 " 0 " "	6 25

No. 13.

	Prices.
3 feet 6 inches open	$17 00

No. 16.

3 feet 2 inches open	$17 50
3 " 6 " "	18 50
3 " 9 " "	20 00
3 " 10 " "	20 25
4 " 0 " "	21 00

No. 19.

DOOR AND WINDOW LINTEL.

4 feet 7 inches open	$48 00
5 " 0 " "	53 00
5 " 2 " "	55 00

No. 21.

3 feet 8 inches open	$24 00
3 " 9 " "	24 50

No. 22.

3 feet 6 inches open	$35 00
3 " 7 " "	36 00

No. 23.

3 feet 6 inches open	$14 50
3 " 7 " "	15 00
3 " 8 " "	15 50

Nos. 24, 25, 26, 27 and 29, as we have no drawings of them, prices will be given on application.

No. 30.

3 feet 2 inches open	$23 00
3 " 8 " "	25 00
3 " 10 " "	26 00

No. 32.

3 feet 8 inches open	$17 00
3 " 9 " "	17 50
3 " 10 " "	18 00

No. 33.

3 feet 8 inches open	$17 00
3 " 9 " "	17 50
3 " 10 " "	18 00

No. 35.

3 feet 0 inches open	$5 50
3 " 2 " "	5 60
3 " 4 " "	5 75
3 " 5 " "	5 80

WINDOW LINTELS AND SILLS, AND DOOR LINTELS.

CONTINUED.

No. 36.

WINDOW LINTEL.

	PRICES.
3 feet 0 inches, open	$7 40
3 " 2 " "	7 50
3 " 4 " "	7 75
3 " 6 " "	8 13
3 " 8 " "	8 50

No. 37.

WINDOW LINTEL.

3 feet 0 inches, open	$7 60
3 " 4 " "	8 13
3 " 8 " "	9 00
4 " 0 " "	10 00

No. 36.

DOOR LINTEL.

	PRICES.
4 feet 8 inches, open	$50 00

No. 50.

DOOR LINTEL.

4 feet 6 inches, open	$80 00
5 " 6 " "	90 00
WITH ARCH.	
4 " 6 " "	110 00
5 " 6 " "	122 00

No. 58.

DOOR LINTEL. Soffit 12 inches.

5 feet 0 inches, open	$40 00

Soffit 4 inches. Suitable for Window Lintel.

4 feet 0 inches, open	$36 00

WINDOW SILLS.

No. 39.

Sill projects from wall 4½ inches.

	PRICES.
2 feet 8 inches, open	$4 40
2 " 10 " "	4 50
3 " 0 " "	4 65
3 " 2 " "	4 80
3 " 4 " "	5 00
3 " 6 " "	5 15
3 " 8 " "	5 35
3 " 9 " "	5 50
3 " 10 " "	5 65
4 " 0 " "	5 80
4 " 2 " "	5 90
4 " 4 " "	6 00

No. 42.

Sill projects from wall 6½ inches.

2 feet 4 inches, open	$4 60
2 " 6 " "	4 70
2 " 8 " "	4 80
2 " 10 " "	4 90
2 " 11 " "	5 10
3 " 0 " "	5 15
3 " 2 " "	5 20
3 " 4 " "	5 50
3 " 6 " "	5 70
3 " 8 " "	5 85
3 " 9 " "	6 00
3 " 10 " "	6 10
4 " 0 " "	6 25
4 " 2 " "	6 45
4 " 4 " "	6 60
4 " 6 " "	6 85

No. 40.

Sill projects from wall 6 inches.

	PRICES.
3 feet 6 inches, open	$7 15
3 " 8 " "	7 38
3 " 10 " "	7 60
4 " 0 " "	7 85
4 " 2 " "	8 10
4 " 4 " "	8 30
4 " 6 " "	8 55
4 " 8 " "	8 80
4 " 10 " "	9 00
5 " 0 " "	9 30

No. 43.

Sill projects from wall 7½ inches.

4 feet 0 inches, open	$14 00
4 " 2 " "	14 50
4 " 4 " "	15 00
4 " 6 " "	15 50
4 " 8 " "	16 00

No. 44.

Sill projects from wall 11 inches.

4 feet 2 inches, open	$18 00
4 " 4 " "	19 00
4 " 6 " "	20 00
4 " 8 " "	21 00

No. 45.

SILL.

3 feet 0 inches, open	$5 00
3 " 4 " "	5 50
3 " 8 " "	6 00
4 " 0 " "	6 50

Cast Iron Beams and Girders.

In proportioning the parts of structures it is customary and expedient to allow considerable excess of strength in favor of stability. Proportions assumed in accordance with usual custom are certainly less reliable than those determined by mathematical demonstration. In cast iron the resistance to compression is $6\frac{1}{2}$ to 1 of extension; whereas in wrought iron the resistance to compression is about 1 to 1.35 of extension. The breaking weight of a cast iron beam or girder should not be less than three times the maximum load which it has to carry, and for those exposed to vibrations, the strength should not be less than six times the weight imposed., as sudden shocks tend far more to destroy the cohesion than a permanent load. Allowance of an excess of strength should be made where a girder is loaded more on one side than on the other, as it will always have a tendency to twist, and thus produce fracture. Failures of cast iron girders and beams have often occurred. Four of such cases during the last year (1870), have happened in the city of New York alone, letting down the parts of the buildings they sustained; and, in not less than thirty different places—in the same year and city—by reason of the excessive deflection of the girders and beams, intermediate supports have been placed to prevent a like disaster. In many other instances the beams and girders have been condemned by the Superintendent of Buildings, as too frail, or not properly proportioned to sustain the load they were required to carry. These failures are to be attributed solely to a want of information either in the designer or constructor; principally from not knowing the correct proportions which give the greatest strength, or not having a proper distribution of the metal. This latter is a point of importance. The different parts should not vary too much in bulk, as it occasions an unequal contraction in cooling. The thin parts cooling more quickly than the thick, a constant interior strain will be exerted on the beam or girder, which materially detracts from the strength it would have to resist a transverse strain, providing the metal had been properly proportioned.

When the fracture of a beam of wood or iron is produced by vertical pressure, the fibres or molecules of the lower section are separated by extension, while at the same time those of the upper section are subjected to compression, consequently a beam or girder of the section, shown in *Fig.* 1, of cast iron, when the weight is placed thereon, will have the bottom rib A in a state of tension, and the top rib B will be in a state of compression; and the parts of the section generally will be extended or compressed according to their distance from the neutral line C D. This neutral line is of course indifferent to the two opposing forces exerted. As the resistance of cast iron to compression is $6\frac{1}{2}$ to 1 of tenacity, to obtain the strongest section, with an economical use of metal, the bottom rib A must have $6\frac{1}{2}$ times the quantity of metal that is contained in the upper rib B.

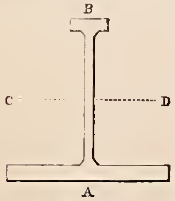


Fig. 1.

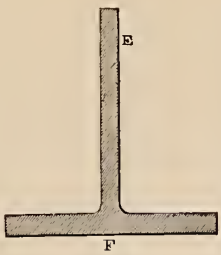


Fig. 2.

In a beam or girder of section, shown in *Fig.* 2, the weakest part is the top of the vertical part E. It cannot resist compression in a degree corresponding to its tenacity, and by the many experiments made as to its strength, it is found that fracture is produced by the crushing of the vertical part E, and to give it the required strength of a beam of the preceding form, a greater quantity of metal must be used, and we have no reliable data to calculate from.

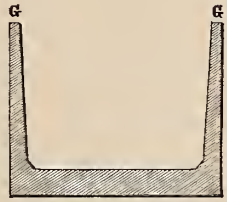


Fig. 3.

Lintels, the form shown in *Fig.* 3, should not be used to span long distances and support heavy walls, as they are not proportioned to give an economical effect in sustaining loads. Their resistance to compression and extension is usually in the ratio of 1 to 10 or 11, and they are liable to be destroyed by compression at the top of the vertical parts G.

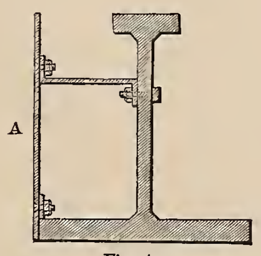
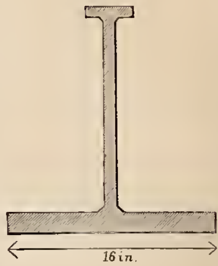


Fig. 4.

In cases where a lintel is required, a beam, of section shown in *Fig.* 4, can be used economically. A fascia plate being bolted on, as shown at A.

(See Over Leaf.)

PRICES AND LENGTHS OF CAST IRON BEAMS, OR GIRDERS,



Of this Section to sustain 4 stories of 16 inch brick wall, not to exceed a height of 50 feet, and exclusive of the weight of floors, or *any other weight*. The weight of the wall to be equally distributed over the whole length of the Beam. Should the weight of the wall, by piers or otherwise, be placed at the centre of Beam one of double the sustaining capacity should be used, and in like proportion.

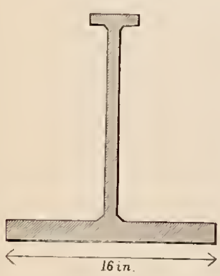
The Beam can be made longer, but the distance between the supports must not be increased to support the given weight.

A Cubic Foot of Brick Work weighs 112 Pounds.

No.	Distance Between Supports.	Bearings on Wall. Each.	Whole Length of Beam.	Weight of Brick Work.	PRICE.
1	18 feet.	16 inches.	20 feet 8 inches.	67½ Net Tons.	Nos. 1 to 4 inclusive, will cost less to use arch girders with rods.
2	17 "	15 "	19 " 6 "	64 "	
3	16 "	14 "	18 " 4 "	60 "	
4	15 "	12 "	17 " 0 "	56¼ "	$130 00
5	14 "	12 "	16 " 0 "	52½ "	112 50
6	13 "	12 "	15 " 0 "	49 "	102 00
7	12 "	10 "	13 " 8 "	45 "	82 00
8	11 "	9 "	12 " 6 "	41¼ "	69 00
9	10 "	9 "	11 " 6 "	37½ "	57 00
10	9 "	9 "	10 " 6 "	33¾ "	48 00
11	8 "	8 "	9 " 4 "	30 "	38 50
12	7 "	8 "	8 " 4 "	26¼ "	33 00

These beams or girders can be used for any other purpose, providing the distributed weight on them does not exceed the number of tons given in the above table.

PRICES AND LENGTHS OF CAST IRON BEAMS, OR GIRDERS,



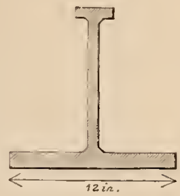
Of this section, to sustain 3 stories of 16 inch brick wall, not to exceed a height of 38 feet, and exclusive of the weight of floors, or *any other weight*. The weight of the wall to be equally distributed over the length of the Beam. Should the weight of the wall, by piers or otherwise, be placed at the centre of Beam, one of about double the sustaining capacity should be used, and in like proportion.

The Beam can be made longer, but the distance between the supports must not be increased to support the given weight.

A Cubic Foot of Brick Work weighs 112 Pounds.

No.	Distance Between Supports.	Bearings on Wall. Each.	Whole Length of Beam.	Weight of Brick Work.	PRICE.
13	20 feet.	16 inches.	22 feet 8 inches.	57 Net Tons.	Nos. 13 to 17 inclusive will cost less to use arch girders with rods.
14	19 "	15 "	21 " 6 "	54¼ "	
15	18 "	15 "	20 " 6 "	51¼ "	
16	17 "	14 "	19 " 4 "	48½ "	
17	16 "	14 "	18 " 4 "	45½ "	
18	15 "	12 "	17 " 0 "	42¾ "	$110 00
19	14 "	12 "	16 " 0 "	40 "	95 00
20	13 "	12 "	15 " 0 "	37 "	82 00
21	12 "	10 "	13 " 8 "	34¼ "	70 00
22	11 "	10 "	12 " 8 "	31½ "	61 00
23	10 "	9 "	11 " 6 "	28½ "	52 50
24	9 "	8 "	10 " 4 "	25¾ "	44 00
25	8 "	8 "	9 " 4 "	22¾ "	36 50

PRICES AND LENGTHS OF CAST IRON BEAMS, OR GIRDERS,



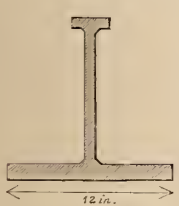
Of this section to sustain 4 stories of 12 inch brick wall, not to exceed the height of 50 feet, and exclusive of the weight of floors, or *any other weight.* The weight of wall to be equally distributed over the length of the Beam. Should the weight of wall, by piers or otherwise, be at the centre of the Beam, one about double the sustaining capacity should be used, and in like proportion.

The Beam can be made longer, but the distance between the supports must not be increased to support the given weight.

A Cubic Foot of Brick Work weighs 112 Pounds.

No.	Distance Between Supports.	Bearings on Wall. each.	Whole Length of Beam.	Weight of Brick Work.	PRICE.
26	22 feet.	12 inches.	24 feet 0 inches.	61½ net tons.	
27	21 "	12 "	23 " 0 "	58¾ " "	For Nos. 26 to 31
28	20 "	12 "	22 " 0 "	56 " "	inclusive, costs less
29	19 "	12 "	21 " 0 "	53¼ " "	to use arch girders
30	18 "	12 "	20 " 0 "	50½ " "	with rods.
31	17 "	12 "	19 " 0 "	47½ " "	
32	16 "	12 "	18 " 0 "	44¾ " "	$132 50
33	15 "	10 "	16 " 8 "	42 " "	111 00
34	14 "	9 "	15 " 6 "	39¼ " "	94 50
35	13 "	9 "	14 " 6 "	36½ " "	80 00
36	12 "	9 "	13 " 6 "	33¾ " "	71 00
37	11 "	9 "	12 " 6 "	30¾ " "	61 50
38	10 "	9 "	11 " 6 "	28 " "	52 00
39	9 "	9 "	10 " 6 "	25¼ " "	44 50
40	8 "	8 "	9 " 4 "	22½ " "	36 50
41	7 "	8 "	8 " 4 "	19¾ " "	33 00

PRICES AND LENGTHS OF CAST IRON BEAMS, OR GIRDERS,



Of this section, to sustain three (3) stories of 12 inch brick wall, not to exceed a height of thirty-eight (38) feet, and exclusive of the weight of the floors, or *any other weight.* The weight of the wall to be equally distributed over the length of the Beam. Should the weight of the wall, by piers or otherwise, be placed at the centre of Beam, one of about double the sustaining capacity should be used and in like proportion.

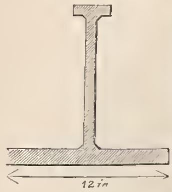
The Beam can be made longer, but the distance between the supports must not be increased to support the given weight.

A Cubic Foot of Brick Work weighs 112 Pounds.

No.	Distance Between Supports.	Bearings on Wall. each.	Whole Length of Beam.	Weight of Brick Work.	PRICE.
42	23 feet.	12 inches.	25 feet 0 inches.	49 net tons.	
43	22 "	12 "	24 " 0 "	46¾ " "	For Nos. 42 to 48
44	21 "	12 "	23 " 0 "	44¾ " "	inclusive costs less
45	20 "	12 "	22 " 0 "	42½ " "	to use arch girders
46	19 "	12 "	21 " 0 "	40½ " "	with rods.
47	18 "	12 "	20 " 0 "	38¼ " "	
48	17 "	12 "	19 " 0 "	36¼ " "	
49	16 "	12 "	18 " 0 "	34 " "	$108 00
50	15 "	10 "	16 " 8 "	32 " "	96 00
51	14 "	10 "	15 " 8 "	29¾ " "	82 00
52	13 "	9 "	14 " 6 "	27¾ " "	73 00
53	12 "	9 "	13 " 6 "	25½ " "	61 50
54	11 "	9 "	12 " 6 "	23½ " "	50 00
55	10 "	8 "	11 " 4 "	21¼ " "	43 50
56	9 "	8 "	10 " 4 "	19¼ " "	36 50
57	8 "	8 "	9 " 4 "	17 " "	31 00
58	7 "	8 "	8 " 4 "	14¾ " "	26 00

These Beams or Girders can be used for any other purpose, providing the distributed weight on them does not exceed the number of Tons given in the above table.

PRICES AND LENGTHS OF CAST IRON BEAMS, OR GIRDERS,



Of this section, to sustain two (2) stories of 12 inch brick wall, not to exceed a height of twenty-six (26) feet, and exclusive of the weight of the floors, or *any other weight.* The weight of the wall to be equally distributed over the length of the beam. Should the weight of wall by piers or otherwise, be placed at the centre of Beam, one of about double the sustaining capacity should be used, and in like proportion.

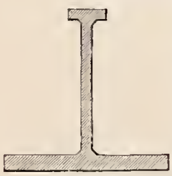
The Beam can be made longer, but the distance between the supports must not be increased to support the given weight.

A Cubic Foot of Brick Work weighs 112 Pounds.

No.	Distance between Supports.	Bearings on Wall, each.	Whole Length of Beam.	Weight of Brick Work.	PRICE.
59	23 feet.	12 inches.	25 feet 0 inches.	$33\frac{1}{2}$ Net Tons.	For Nos. 59 to 63 inclusive will cost less to use arch girders with rods.
60	22 "	12 "	24 " 0 "	32 " "	
61	21 "	12 "	23 " 0 "	$30\frac{1}{2}$ " "	
62	20 "	12 "	22 " 0 "	$29\frac{1}{8}$ " "	
63	19 "	12 "	21 " 0 "	$27\frac{3}{4}$ " "	
64	18 "	12 "	20 " 0 "	$26\frac{1}{4}$ " "	$106 00
65	17 "	12 "	19 " 0 "	$24\frac{3}{4}$ " "	97 50
66	16 "	12 "	18 " 0 "	$23\frac{1}{4}$ " "	89 00
67	15 "	10 "	16 " 8 "	$21\frac{3}{4}$ " "	77 00
68	14 "	10 "	15 " 8 "	$20\frac{3}{8}$ " "	66 00
69	13 "	9 "	14 " 6 "	$18\frac{7}{8}$ " "	59 00
70	12 "	9 "	13 " 6 "	$17\frac{1}{2}$ " "	50 50
71	11 "	9 "	12 " 6 "	16 " "	41 00
72	10 "	8 "	11 " 4 "	$14\frac{1}{2}$ " "	37 00
73	9 "	8 "	10 " 4 "	$13\frac{1}{8}$ " "	34 00
74	8 "	7 "	9 " 2 "	$11\frac{5}{8}$ " "	28 50
75	7 "	7 "	8 " 2 "	$10\frac{1}{4}$ " "	24 00

These Beams or Girders can be used for any other purpose providing the distributed weight on them does not exceed the number of tons given in the above table.

PRICES AND LENGTHS OF CAST IRON BEAMS, OR GIRDERS,



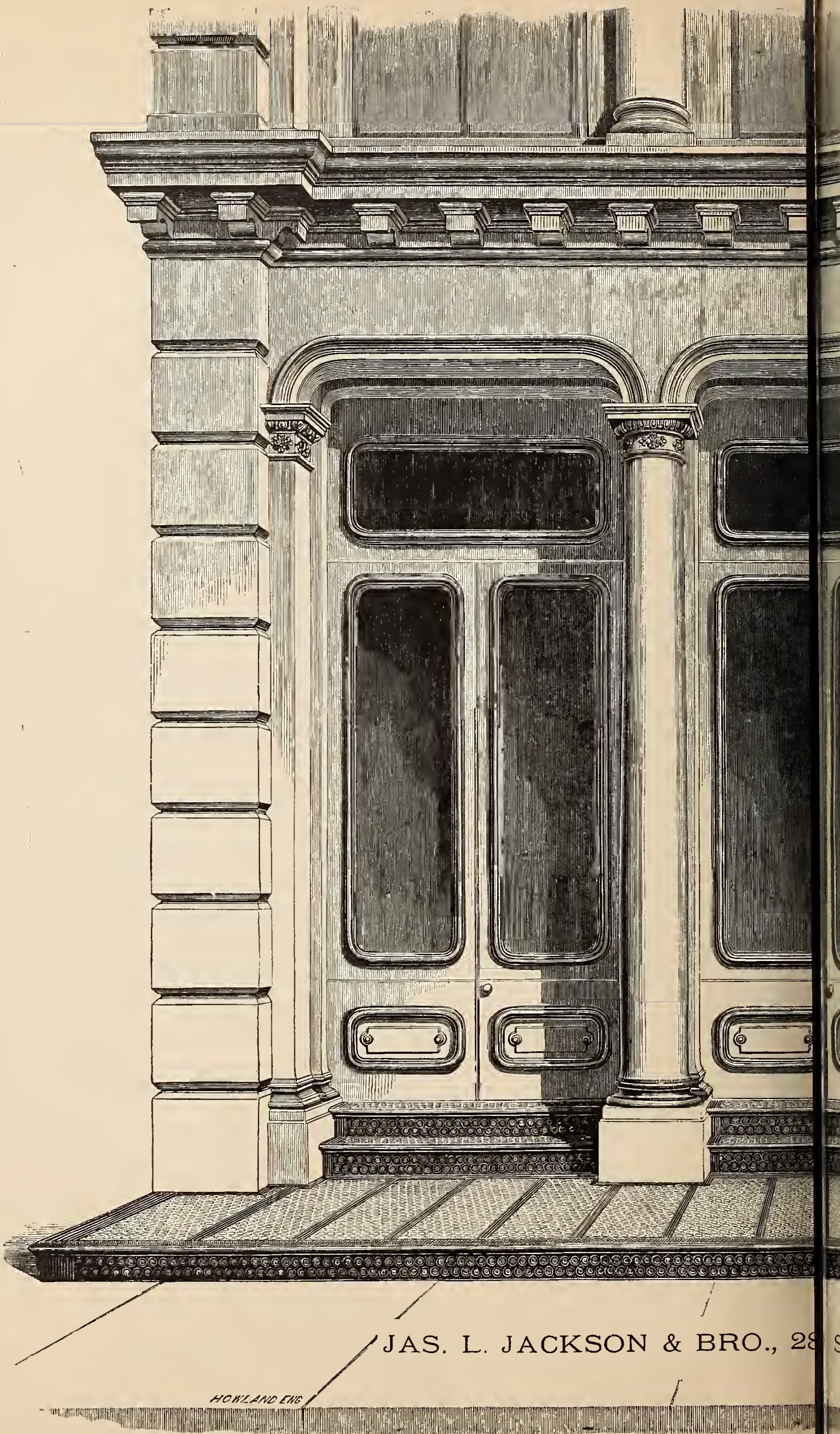
Of this section to sustain two (2) stories of 8 inch brick wall, not to exceed a height of twenty-six (26) feet, and exclusive of the weight of the floors, or *any other weight.* The weight of the wall to be equally distributed over the length of the Beam. Should the weight of wall be placed at the centre of Beam, one of double the sustaining capacity should be used, and in like proportion.

The Beam can be made longer, but the distance between the supports must not be increased to support the given weight.

A Cubic Foot of Brick Work weighs 112 Pounds.

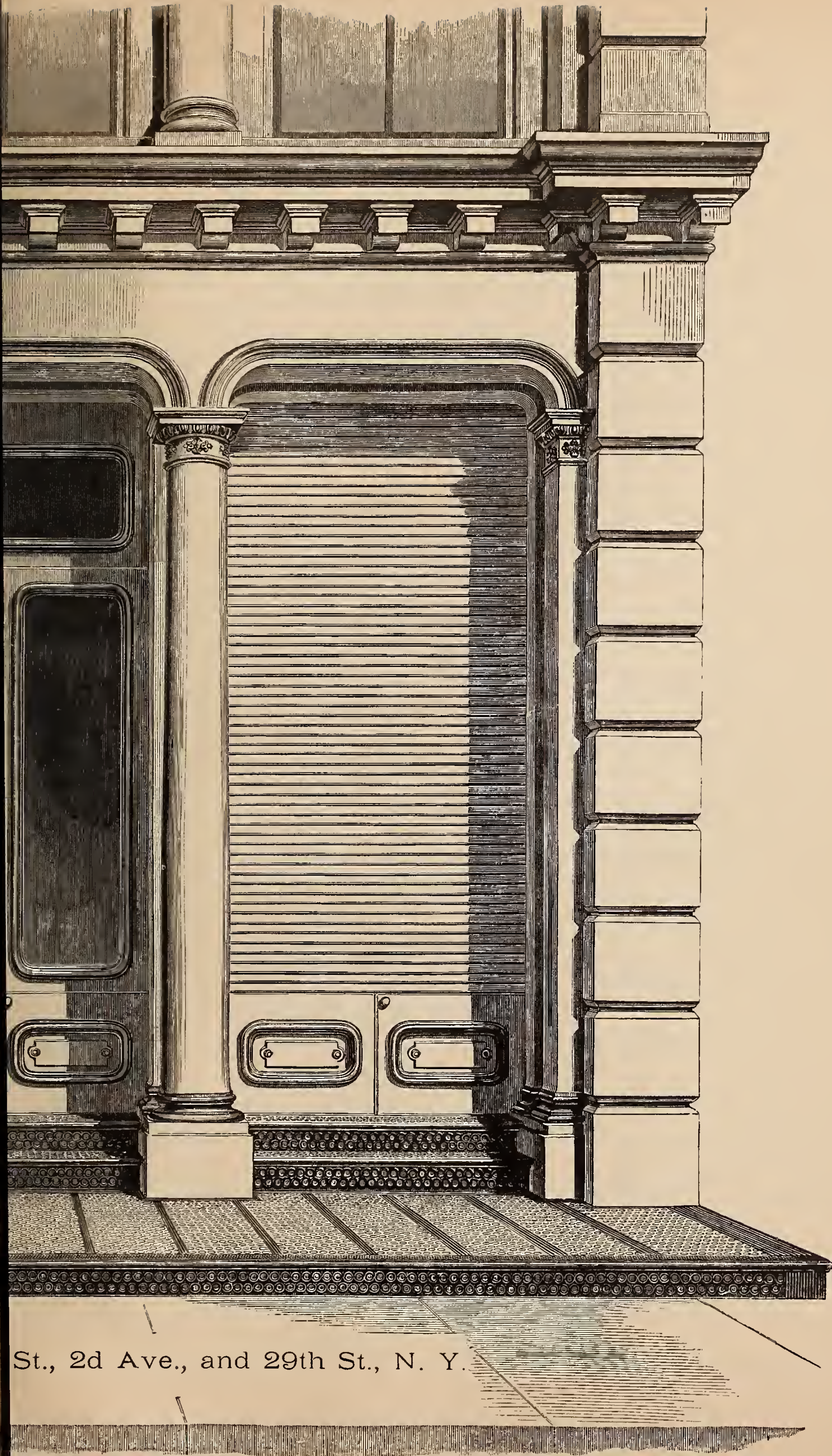
No.	Distance between Supports.	Bearings on Wall, each.	Whole Length of Beam.	Weight of Brick Work.	PRICE.
81	18 feet.	12 inches.	20 feet 0 inches.	$17\frac{1}{2}$ Net Tons.	$88 00
82	17 "	12 "	19 " 0 "	$16\frac{1}{2}$ " "	79 00
83	16 "	12 "	18 " 0 "	$15\frac{5}{8}$ " "	71 00
84	15 "	10 "	16 " 8 "	$14\frac{5}{8}$ " "	62 00
85	14 "	10 "	15 " 8 "	$13\frac{5}{8}$ " "	54 50
86	13 "	9 "	14 " 6 "	$12\frac{5}{8}$ " "	46 00
87	12 "	8 "	13 " 4 "	$11\frac{3}{4}$ " "	41 00
88	11 "	8 "	12 " 4 "	$10\frac{3}{4}$ " "	37 00
89	10 "	8 "	11 " 4 "	$9\frac{3}{4}$ " "	32 00
90	9 "	7 "	10 " 2 "	$8\frac{3}{4}$ " "	27 00
91	8 "	6 "	9 " 0 "	$7\frac{8}{10}$ " "	24 00
92	7 "	6 "	8 " 0 "	$6\frac{8}{10}$ " "	22 00

These beams or girders can be used for any other purpose, provided the distributed weight on them does not exceed the number of tons given in the above table.



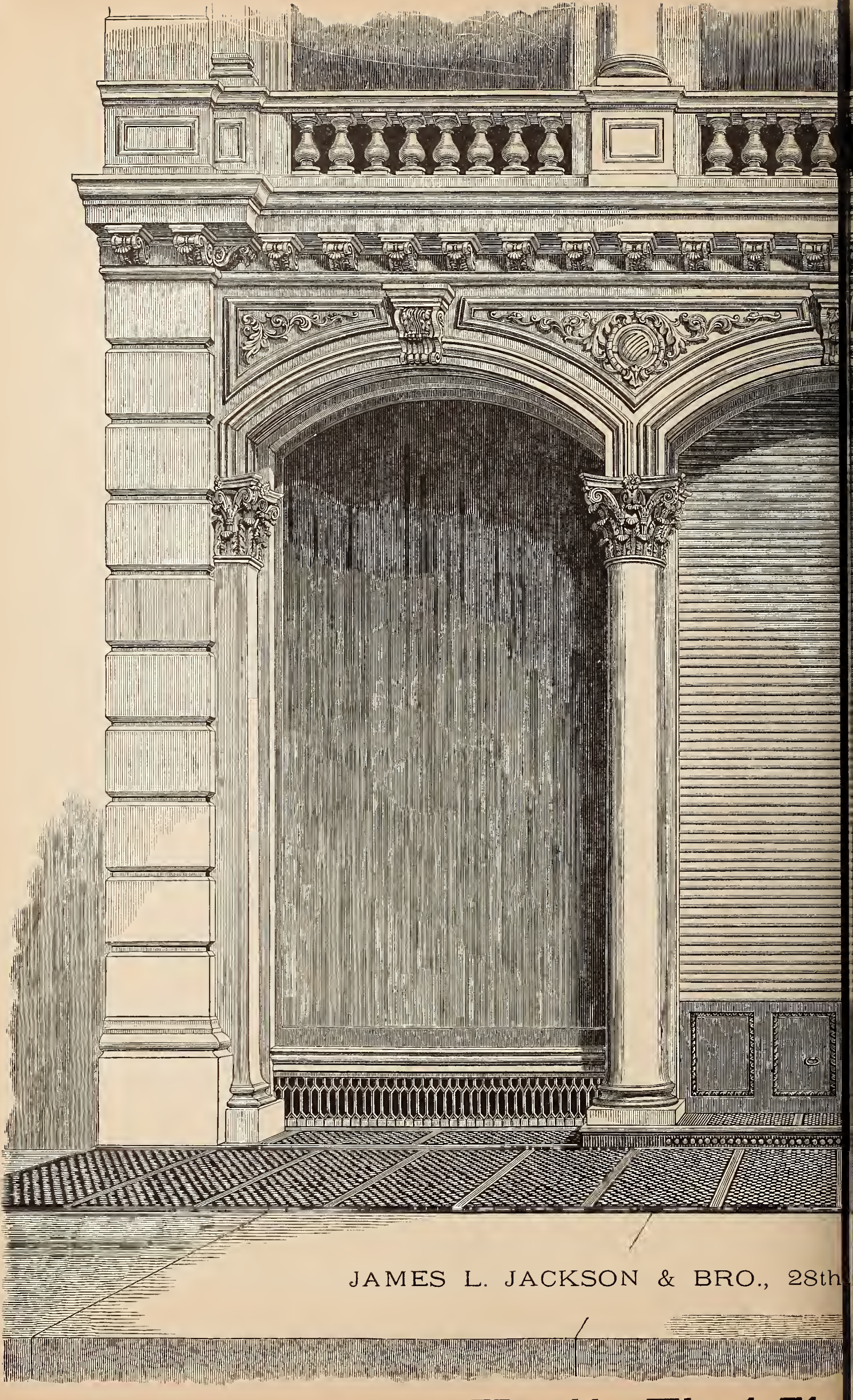
JAS. L. JACKSON & BRO., 28 S

No. 8. First St

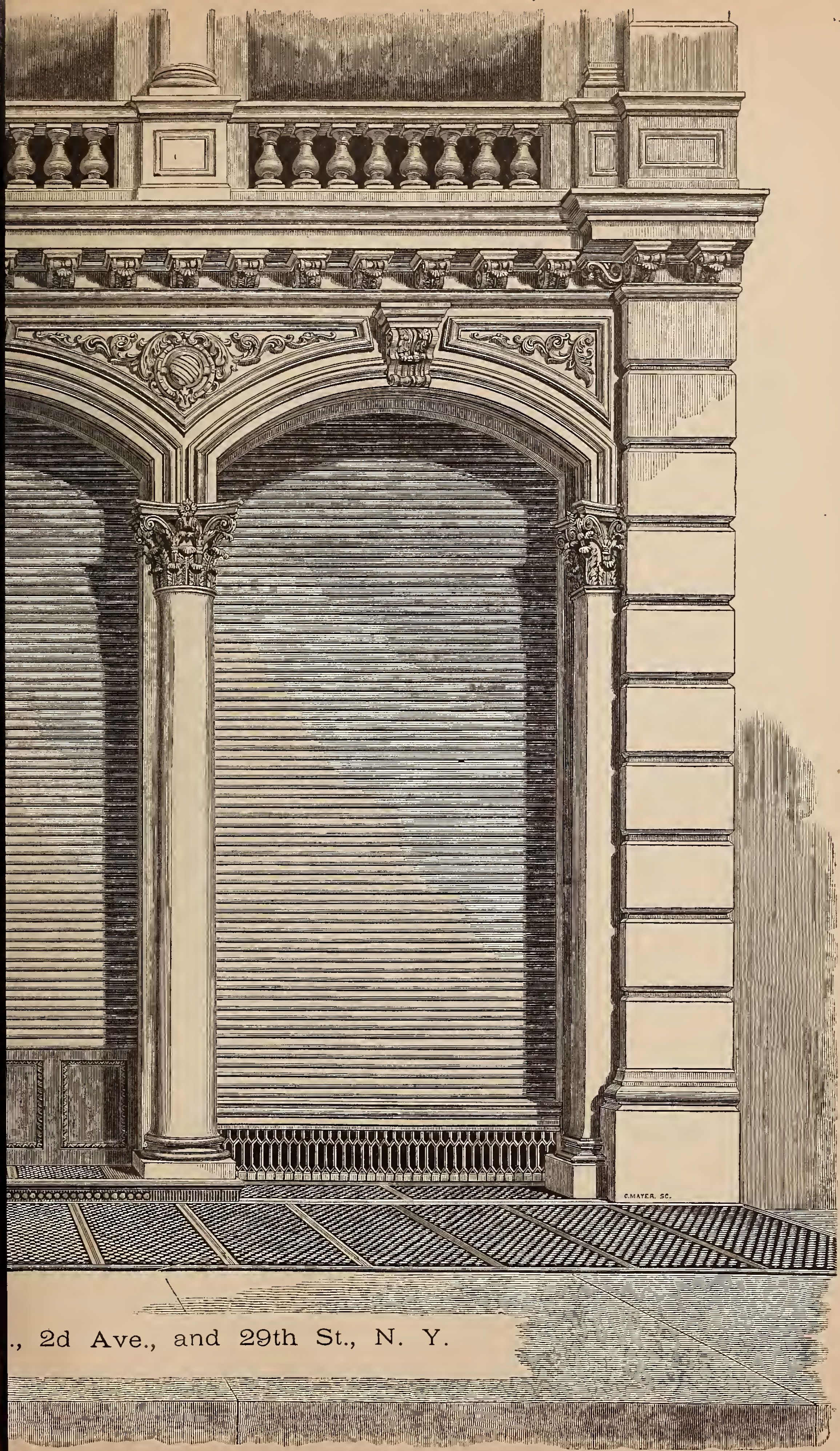


St., 2d Ave., and 29th St., N. Y.

ry. Iron Front.



No. 11. First Sto



., 2d Ave., and 29th St., N. Y.

y. Iron Front.

No. 1. FIRST STORY FRONT.

We have various designs of First Story Fronts, other than those shown in this book. Estimates will be furnished on application to parties who intend erecting stores, for either First Story or Entire Iron Fronts. Such application should be accompanied with particulars.

Prices per Foot, and Lengths

OF

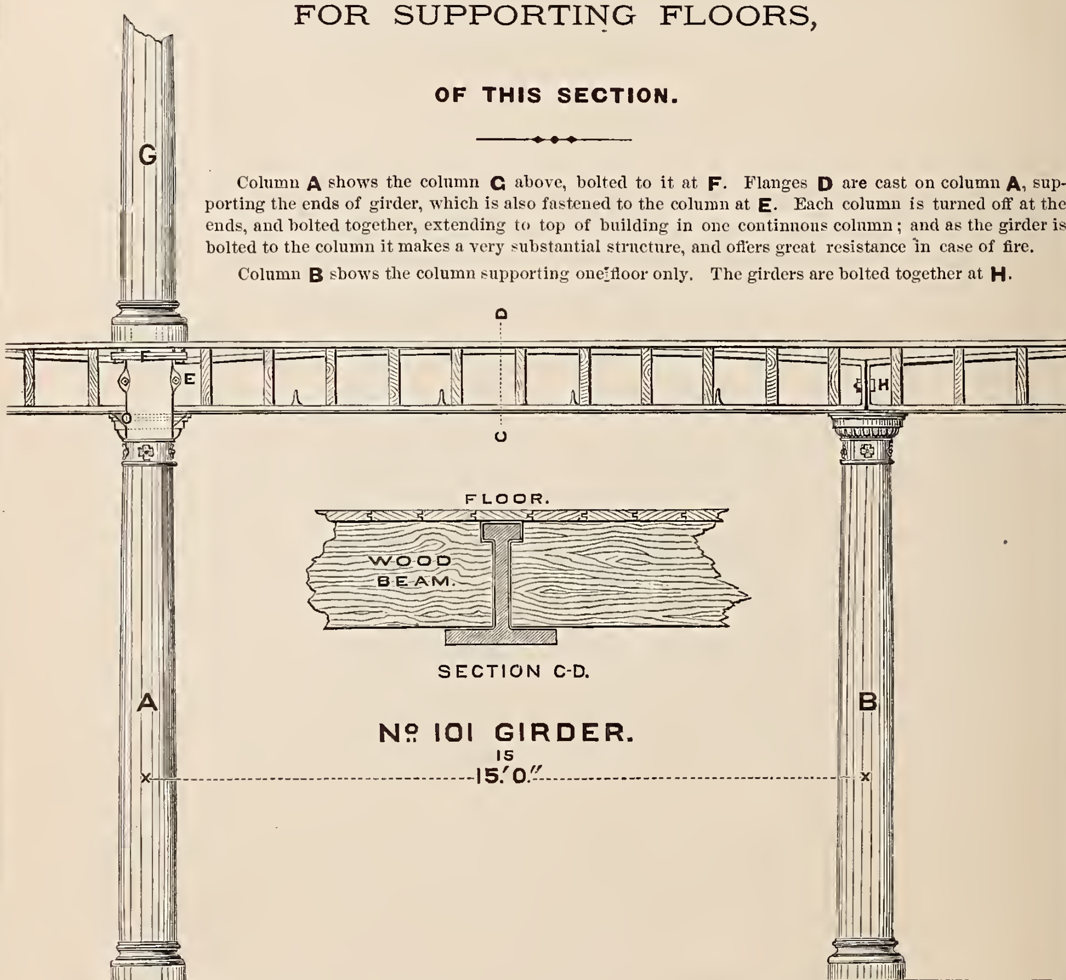
CAST IRON GIRDERS

FOR SUPPORTING FLOORS,

OF THIS SECTION.

Column **A** shows the column **G** above, bolted to it at **F**. Flanges **D** are cast on column **A**, supporting the ends of girder, which is also fastened to the column at **E**. Each column is turned off at the ends, and bolted together, extending to top of building in one continuous column; and as the girder is bolted to the column it makes a very substantial structure, and offers great resistance in case of fire.

Column **B** shows the column supporting one floor only. The girders are bolted together at **H**.



These Girders are made especially to support wooden beams and flooring. By their use the floor beams are placed upon the bottom flange instead of the top of girder, saving about 12 inches in height on each floor.

Taking the weight upon floor surface at 120 pounds per foot, and the weight of girder, beams and flooring at an average weight of 40 pounds per foot, we have 160 pounds per superficial foot—distributed weight—to be sustained by girder.

Instance—No. 101.

Distance from party wall to party wall 60 feet. One half of this weight is borne by girder—equal to 30 feet. Distance from centre to centre of column, 15 feet.

30 × 15 = 450 feet @ 160 lbs. per foot = 72,000 lbs. or 36 net tons.

PRICES AND LENGTHS OF CAST IRON GIRDERS.—Continued.

(For Illustrations, see preceding page.)

No. of Girder.	Distance from wall to wall. Half this only sustained by Girder.	Distance from centre to centre of columns.	Total Feet sustained by one Girder.	Weight per Superficial Foot.	Net Tons sustained by each Girder.	Price of Girder per foot.
101	60 feet.	15 feet.	450	160 pounds.	36	$7 00
102	60 "	14 "	420	" "	$33\frac{6}{10}$	6 70
103	60 "	13 "	390	" "	$31\frac{2}{10}$	6 00
104	60 "	12 "	360	" "	$28\frac{8}{10}$	5 50
105	60 "	11 "	330	" "	$26\frac{4}{10}$	5 00
106	60 "	10 "	300	" "	24	4 60
107	56 "	17 "	476	" "	$38\frac{1}{10}$	7 84
108	56 "	16 "	448	" "	$35\frac{8}{10}$	7 15
109	56 "	15 "	420	" "	$33\frac{6}{10}$	6 85
110	56 "	14 "	392	" "	$31\frac{7}{10}$	6 38
111	56 "	13 "	364	" "	$29\frac{1}{10}$	5 83
112	56 "	12 "	336	" "	$26\frac{9}{10}$	5 27
113	56 "	11 "	308	" "	$24\frac{6}{10}$	4 72
114	56 "	10 "	280	" "	$22\frac{4}{10}$	4 40
115	52 "	17 "	442	" "	$35\frac{3}{10}$	7 65
116	52 "	16 "	416	" "	$33\frac{1}{4}$	7 00
117	52 "	15 "	390	" "	$31\frac{1}{4}$	6 55
118	52 "	14 "	364	" "	$29\frac{1}{8}$	6 25
119	52 "	13 "	338	" "	27	5 75
120	52 "	12 "	312	" "	25	5 25
121	52 "	11 "	286	" "	$22\frac{7}{8}$	4 55
122	52 "	10 "	260	" "	$20\frac{8}{10}$	4 15
123	48 "	17 "	408	" "	$32\frac{5}{8}$	7 35
124	48 "	16 "	384	" "	$30\frac{7}{10}$	6 83
125	48 "	15 "	360	" "	$28\frac{8}{10}$	6 33
126	48 "	14 "	336	" "	$26\frac{7}{8}$	5 85
127	48 "	13 "	312	" "	25	5 38
128	48 "	12 "	288	" "	23	4 72
129	48 "	11 "	264	" "	$21\frac{1}{8}$	4 18
130	48 "	10 "	240	" "	$19\frac{1}{4}$	3 97
131	44 "	17 "	374	" "	30	7 00
132	44 "	16 "	352	" "	$28\frac{1}{4}$	6 58
133	44 "	15 "	330	" "	$26\frac{4}{10}$	6 10
134	44 "	14 "	308	" "	$24\frac{5}{8}$	5 54
135	44 "	13 "	286	" "	$22\frac{7}{8}$	5 04
136	44 "	12 "	264	" "	$21\frac{1}{8}$	4 60
137	44 "	11 "	242	" "	$19\frac{3}{8}$	4 00
138	44 "	10 "	220	" "	$17\frac{5}{8}$	3 80
139	40 "	17 "	340	" "	$27\frac{2}{10}$	6 60
140	40 "	16 "	320	" "	$25\frac{6}{10}$	6 28
141	40 "	15 "	300	" "	24	5 60
142	40 "	14 "	280	" "	$22\frac{4}{10}$	5 20
143	40 "	13 "	260	" "	$20\frac{8}{10}$	4 62
144	40 "	12 "	240	" "	$19\frac{2}{10}$	4 32
145	40 "	11 "	220	" "	$17\frac{6}{10}$	3 85
146	40 "	10 "	200	" "	16	3 65

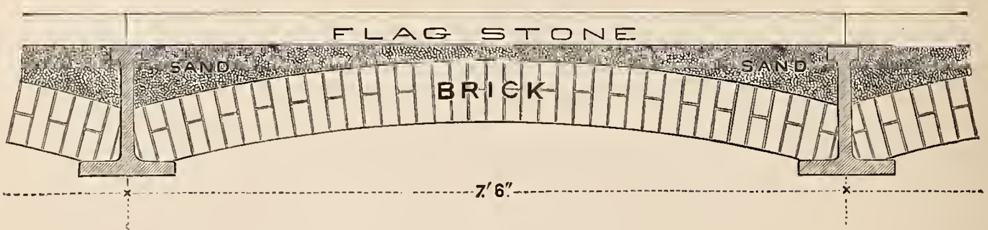
These girders can be used for any other purpose, such as sustaining brick wall or other weight, provided the distributed weight does not exceed the net tons sustained by each girder, with the same distance between supports. For a load in centre of girder one of double capacity should be used.

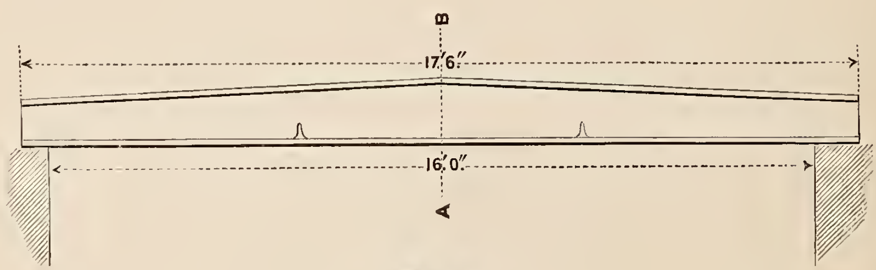
Prices and Lengths

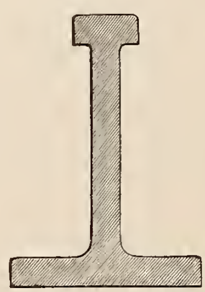
OF

CAST IRON VAULT BEAMS

OF AMPLE STRENGTH.







SECTION.—AB.

Brick Arches—8 inches thick—together with filling in, on top, up to a level line, equal to 12 inches of brick work..........	112 lbs.
Layer, of sand and asphaltum, 2 inches thick; sand weighs 128 lbs. per cubic foot..........	21 "
Flag Stones—4 inches thick—weigh 166 lbs. per cubic foot..........	55 "
Weight of brick work, sand, asphaltum and flagstones..........	188 lbs.
Weight incumbent per superficial foot..........	120 "
Total Weight,	308 lbs.

If Quincy Granite is used in place of brick arches, etc., usually 10 inches thick, it will weigh 140 lbs. per foot in place of 188 lbs., as computed above.

Example.

Taking the distance from centre to centre of beam at the greatest span ever used, 7 feet 6 inches, and the distance between supports at 16 feet.

7 ft. 6 in. × 16 ft. = 120 ft. @ 308 lbs. = 36,960 lbs., or 18½ net tons.

Bearings on wall 6 inches at one end, and not over one foot at the other, making whole length of beam, 17 feet, 6 inches.

No.	Distance between Supports.	Span of Arch from centre to centre of Beam. Greatest ever made.	Total area of feet Supported by Beam.	Weight per foot in pounds.	Total Weight in Net Tons.	Whole Length of Beam. Bearings not exceeding 1 foot 6 in.	PRICE.
147	16 feet.	7 feet 6 in.	120 feet.	308	18½	17 ft. 6 inch.	$72 00
148	15 "	7 " 6 "	112 " 6 inch.	"	17¼	16 " 6 "	62 00
149	14 "	7 " 6 "	105 " 0 "	"	16¼	15 " 6 "	55 00
150	13 "	7 " 6 "	97 " 6 "	"	15	14 " 6 "	48 00
151	12 "	7 " 6 "	90 " 0 "	"	13⅞	13 " 6 "	42 00
152	11 "	7 " 6 "	82 " 6 "	"	12¾	12 " 6 "	35 00
153	10 "	7 " 6 "	75 " 0 "	"	$11\frac{6}{10}$	11 " 6 "	31 00
154	9 "	7 " 6 "	67 " 6 "	"	$10\frac{4}{10}$	10 " 6 "	26 00
155	8 "	7 " 6 "	60 " 0 "	"	9¼	9 " 6 "	23 50
156	7 "	7 " 6 "	52 " 6 "	"	$8\frac{1}{10}$	8 " 6 "	21 00
157	6 "	7 " 6 "	45 " 0 "	"	$6\frac{19}{20}$	7 " 6 "	19 00

CRESTINGS FOR MANSARD OR FRENCH ROOFS.

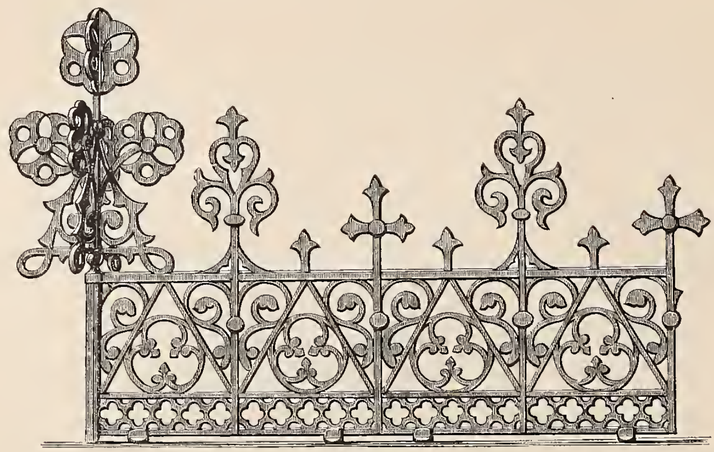
PRICES FOR CRESTINGS, WITH FINIALS,

AVERAGING NOT NEARER THAN 25 FEET.

No. 1 Pattern.

Where Finials intervene, an additional price, as mentioned below, for each Finial.

No.		PRICE.
1	PATTERN—26 in. high, with Finials, per lineal ft	$1 65
	Screwed up on wood in this city	1 80
	Additional Finials, each	3 00
2	OR SMALL RING PATTERN—19½ in. high, with Finials, per lineal ft.	1 35
	Screwed up on wood in this city	1 50
	Additional Finials, each	2 00
2	SMALLEST PATTERN—12 in. high, with Finials, per lineal ft.	95
	Screwed up on wood in this city	1 09
	Additional Finials, each	1 25
3	—28 in. high, with Finials, per lineal ft.	1 66
	Screwed up on wood in this city	1 82
	Additional Finials, each	3 50
4	—6½ in. high, with Finials, per lineal ft.	65
	Screwed up on wood in this city	77
	Additional Finials, each	1 25
4	—11 in. high, with Finials, per lineal ft.	90
	Screwed up on wood in this city	1 05
	Additional Finials, each	1 25
5	—10½ in. high, with Finials, per lineal ft.	90
	Screwed up on wood in this city	1 03
	Additional Finials, each	1 25
6	—24 in. high, with Finials, per lineal ft.	1 50
	Screwed up on wood in this city	1 65
	Additional Finials, each	3 00
7	—16 in. high, with Finials, per lineal ft.	$1 25
	Screwed up on wood in this city	1 38
	Additional Finials, each	2 00
7	—12 in. high, with Finials, per lineal ft.	1 00
	Screwed up on wood in this city	1 14
	Additional Finials, each	1 25
8	—9 in. high, with Finials, per lineal ft.	85
	Screwed up on wood in this city	97
	Additional Finials, each	1 25
8	HIGH PATTERN—19½ in. high, with Finials, per lineal ft.	1 32
	Screwed up on wood in this city	1 47
	Additional Finials, each	2 00
9	—30 in. high, with Finials, per lineal ft.	1 90
	Screwed up on wood in this city	2 06
	Additional Finials, each	3 00
10	—21½ in. high, with Finials, per lineal ft.	1 40
	Screwed up on wood in this city	1 54
	Additional Finials, each	3 00
10	HIGH PATTERN—30 in. high, with Finials, per lineal foot	2 00
	Screwed up on wood in this city	2 16
	Additional Finials, each	3 50
11	—27 in. high, with Finials, per lineal ft.	1 65
	Screwed up on wood in this city	1 80
	Additional Finials, each	3 00



No. 3 Pattern.

No.	Prices.
12—23½ in. high, with Finials, per lineal ft..	$1 40
Screwed up on wood in this city......	1 54
Additional Finials, each..............	2 50
13—22½ in. high, with Finials, per lineal ft..	1 38
Screwed up on wood in this city......	1 52
Additional Finials, each..............	2 00
14—20¼ in. high, with Finials, per lineal ft..	1 30
Screwed up on wood in this city......	1 45
Additional Finials, each..............	2 00
15—28½ in. high, with Finials, per lineal ft..	1 80
Screwed up on wood in this city......	1 96
Additional Finials, each..............	3 00
16—36 in. high, with Finials, per lineal ft..	2 40
Screwed up on wood in this city......	2 60
Additional Finials, each..............	4 00
16—30 in. high, with Finials, per lineal ft..	2 00
Screwed up on wood in this city......	2 22
Additional Finials, each..............	3 00
16—21 in. high, with Finials, per lineal ft..	1 60
Screwed up on wood in this city......	1 75
Additional Finials, each..............	2 50
17—21 in. high, with Finials, per lineal ft..	1 30
Screwed up on wood in this city......	1 45
Additional Finials, each..............	1 50
18—12½ in. high, with Finials, per lineal ft..	1 00
Screwed up on wood in this city......	1 14
Additional Finials, each..............	1 00
19—51 in. high, with Finials, per lineal ft..	4 00
Screwed up on wood in this city......	4 40
Additional Finials, each..............	10 00
19—33 in. high, with Finials, per lineal ft..	2 05
Screwed up on wood in this city......	2 22
Additional Finials, each..............	4 00
20—14½ in. high, with Finials, per lineal ft..	1 12
Screwed up on wood in this city......	1 26
Additional Finials, each..............	1 50

No.	Prices.
22—19 in. high, with Finials, per lineal ft..	1 25
Screwed up on wood in this city......	1 40
Additional Finials, each..............	2 00
23—30 in. high, with Finials, per lineal ft..	2 00
Screwed up on wood in this city......	2 16
Additional Finials, each..............	3 50
24—19 in. high, with Finials, per lineal ft..	1 25
Screwed up on wood in this city......	1 40
Additional Finials, each..............	1 50
25—Finial and Ball 8.0 high below the Ball, diameter of Ball 12 inches.............	43 00
26—Wrought and Cast-iron Railing, per lineal ft..............................	4 50
27—Wrought and Cast-iron Railing, per lineal ft..............................	4 50
28—14 in. high, with Finials, per lineal ft..	1 00
Screwed up on wood in this city......	1 14
Additional Finials, each..............	1 00
29—36 in. high, with Finials, per lineal ft..	2 50
Screwed up on wood in this city......	2 75
Additional Finials, each..............	4 00
30—24 in. high, with Finials, per lineal ft..	1 50
Screwed up on wood in this city......	1 65
Additional Finials, each..............	2 50
31—25 in. high, with Finials, per lineal ft..	1 50
Screwed up on wood in this city......	1 65
Additional Finials, each..............	2 50
32—35 in. high, with Finials, per lineal ft..	2 15
Screwed up on wood in this city......	2 35
Additional Finials, each..............	3 50
32—29 in. high, with Finials, per lineal ft..	1 90
Screwed up on wood in this city......	2 06
Additional Finials, each..............	3 00

Cresting for Towers, Bay Windows, or right-angle pieces, where breaks of any kind occur nearer than once in 10 feet, an additional charge of $1.00 for each break is made for Nos. 1, 3, 9, (10 of 30 inches high), 11, 15, (16 of 30 inches high), 23 and 32.

For Nos. 6, 7, (8 of 19½ inches high), 10 of 21½ inches high, 12, 13, 14, (16 of 21 inches high), 17, 22, 24, 30 and 31, 75 cents for each break.

For Nos. 4, 5, 8, (2 and 7 of 12 inches high), 18, 20 and 28, 50 cents for each break.

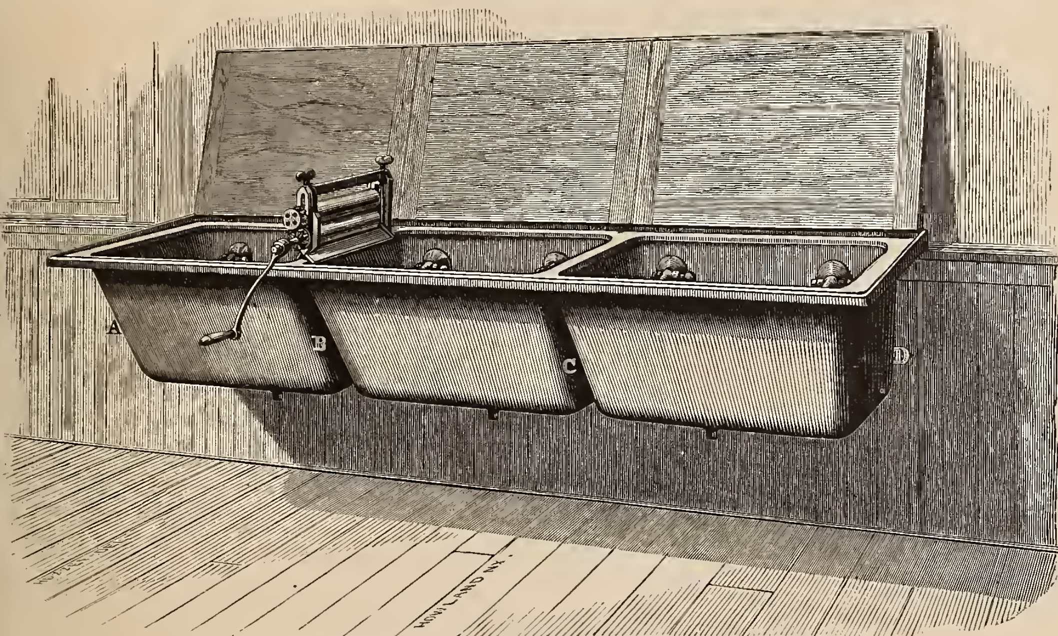
For No. 16 of 36 inches high, 19 of 33 inches high, and 29, $1.50 for each break.

For No. 19 of 51 inches high, $2.50 for each break.

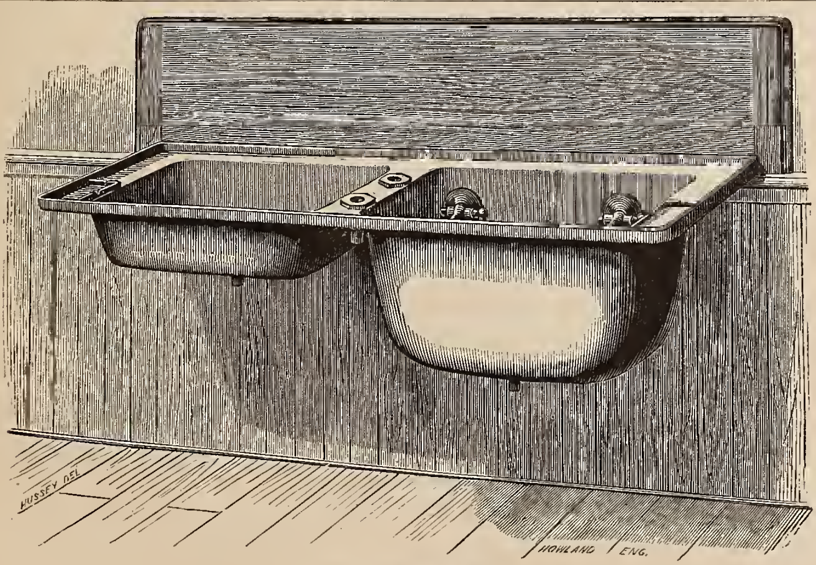
IRON WASH TUBS GALVANIZED.

PATENT APPLIED FOR.

For First-class Residences, and others, in place of the Soap Stone, Slate and Wooden Tubs, so extensively used.



Three Wash Tubs, with Brackets at B and C to support them.

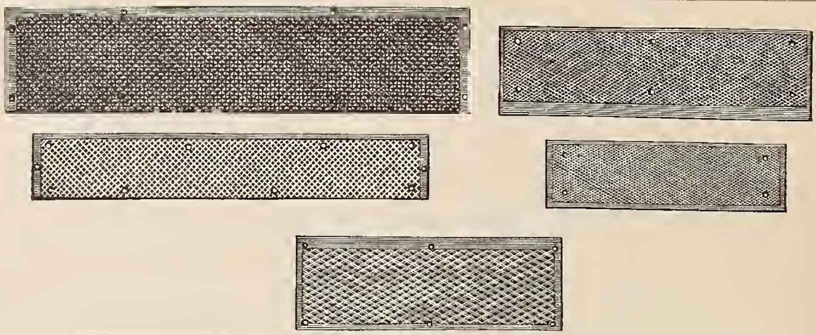


Wash Tub and Sink.

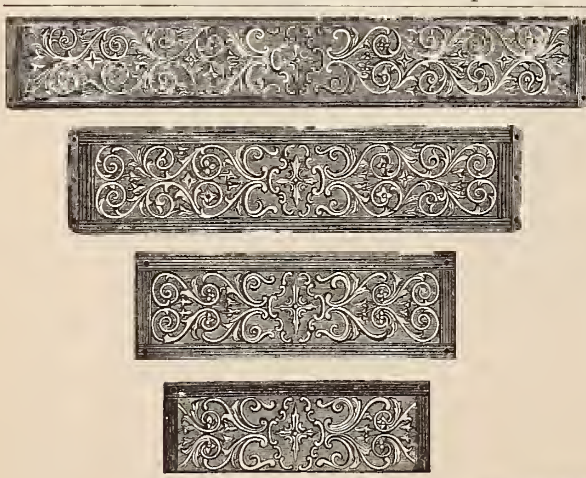
These Tubs are fastened in position by iron Brackets, screwed to the wall at B and C, requiring no legs to support them. The frame between the Tubs is arranged with ears to receive a Clothes Wringer; and the Wringer can be removed at pleasure. The Galvanizing, or covering of the iron with Zinc, is of *double thickness*, which *entirely avoids* the slightest injury to the clothes by rust. Any number of Tubs can be put in a row. To be with or without wooden lids. Those to whom we have sold them speak in their highest praise. There are no seams or joints, as in Slate or Soap Stone, to leak; they are free from smell, croton bugs, or roaches, and do not retain any of the impurities of the soaked wooden Tubs. We can make any size to order.

Three Tubs, as shown above	$53 00
Two Tubs, same as shown of three Tubs	41 00
Wash Tub and Sink, as shown above ... each	34 00

DIAMOND PATTERN STEP-PLATE.



					Price.
No. 1.	Size, 2 feet $5\frac{3}{8}$ inches long	x $6\frac{3}{8}$ inches wide.		No Nosing	$1 08
" 2.	" 2 feet 6 inches "	x $4\frac{3}{4}$ inches "		"	83
" 3.	" 2 feet $1\frac{1}{4}$ inches "	x 4 inches "		With Nosing	67
" 4.	" 2 feet 0 inches "	x $6\frac{1}{2}$ inches "		"	75
" 5.	" 1 foot 8 inches "	x 5 inches "		"	48
" 6.	" 1 foot $7\frac{1}{2}$ inches "	x $6\frac{3}{4}$ inches "		"	80
" 7.	" 1 foot $8\frac{1}{4}$ inches "	x $6\frac{1}{2}$ inches "		"	68
" 8.	" 2 feet $2\frac{1}{2}$ inches "	x $4\frac{3}{4}$ inches "		"	56
" 9.	" 1 foot $8\frac{1}{4}$ inches "	x $6\frac{1}{2}$ inches "		"	67
" 10.	" 2 feet 1 inch "	x 6 inches "		"	1 00
" 11.	" 1 foot $9\frac{1}{4}$ inches "	x $3\frac{1}{2}$ inches "		"	45
" 12.	" 2 feet 5 inches "	x $2\frac{1}{2}$ inches "		"	52
" 13.	" 1 foot $11\frac{3}{4}$ inches "	x $2\frac{1}{2}$ inches "		"	49
" 14.	" 2 feet $10\frac{1}{2}$ inches "	x $5\frac{1}{4}$ inches "		"	1 08
" 15.	" 2 feet 11 inches "	x $7\frac{3}{4}$ inches "		"	1 70
" 16.	" 2 feet $1\frac{1}{2}$ inches "	x 7 inches "		"	94
" 17.	" 2 feet 0 inches "	x $6\frac{3}{4}$ inches "		"	77
" 18.	" 2 feet 0 inches "	x $6\frac{1}{2}$ inches "		"	84
" 19.	" 2 feet $2\frac{3}{4}$ inches "	x $4\frac{1}{2}$ inches "		"	62
" 20.	" 2 feet 3 inches "	x 5 inches "		"	75
" 21.	" 1 foot $7\frac{3}{4}$ inches "	x $6\frac{1}{2}$ inches "		"	63
" 22.	" 1 foot 6 inches "	x 5 inches "		"	48
" 23.	" 2 feet 0 inches "	x $7\frac{3}{4}$ inches "		" T.	1 20



SCROLL PATTERN STEP-PLATE

WITH NOSING.

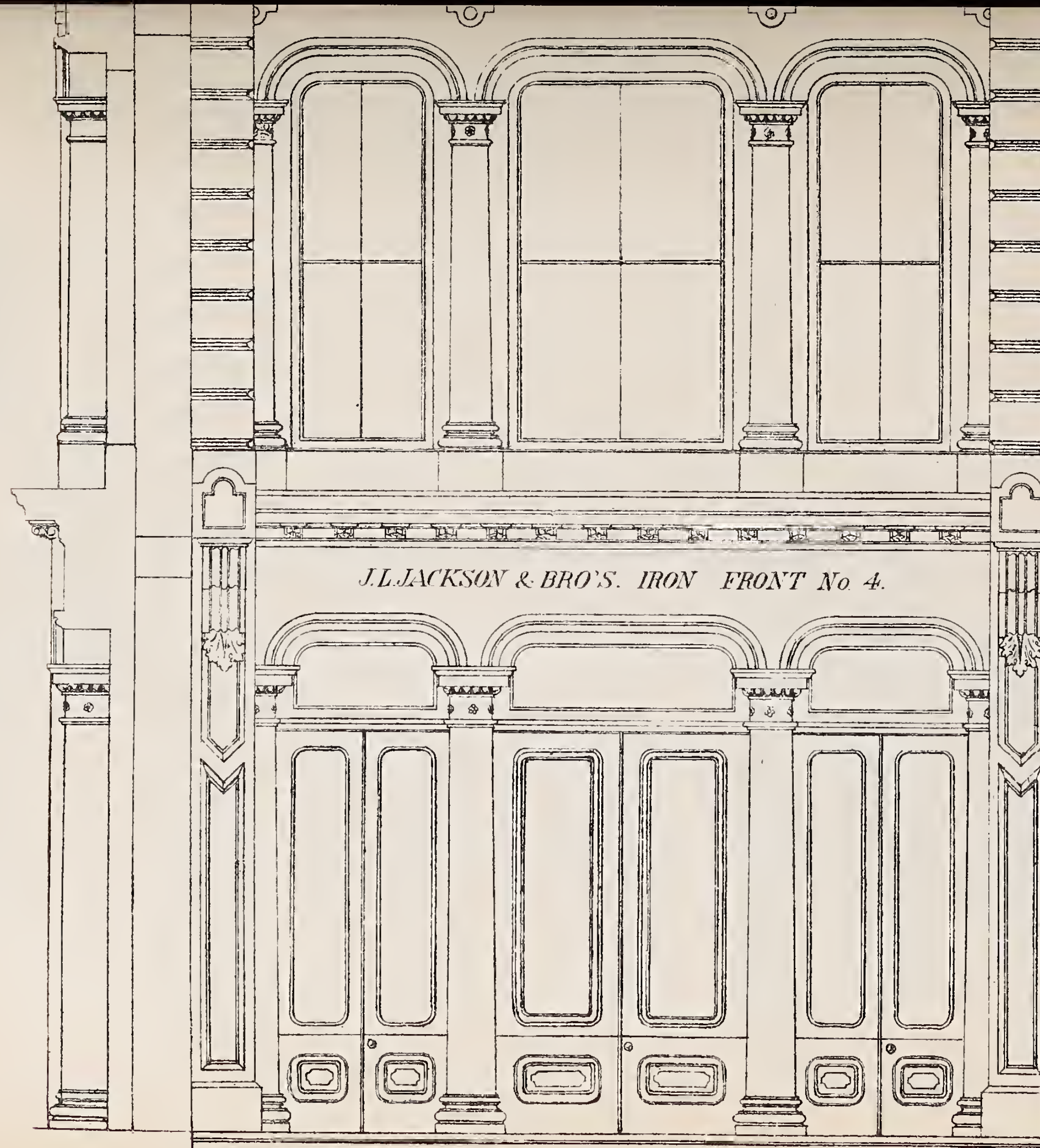
No.	Length.	Width.	Price.
24	1 ft. 8 in.	x $6\frac{3}{8}$ in.	$ 60
25	3 ft. $0\frac{3}{4}$ in.	x $6\frac{3}{4}$ in.	2 00
26	2 ft. $8\frac{1}{4}$ in.	x $7\frac{1}{2}$ in.	1 45
27	2 ft. 0 in.	x $7\frac{3}{4}$ in.	83
28	3 ft. $1\frac{1}{2}$ in.	x 7 in.	1 30
29	2 ft. $5\frac{3}{4}$ in.	x $6\frac{3}{4}$ in.	1 10
30	2 ft. 1 in.	x 10 in.	1 56
31	2 ft. 0 in.	x 10 in.	1 45
32	2 ft. 10 in.	x $7\frac{3}{4}$ in.	1 25

T.

ORNAMENTAL IRON TILING.

FOR FLOORS.

No. 33. Made in Plates 12 inches square. See Drawing. Per superficial foot. . . . . T. 65c.



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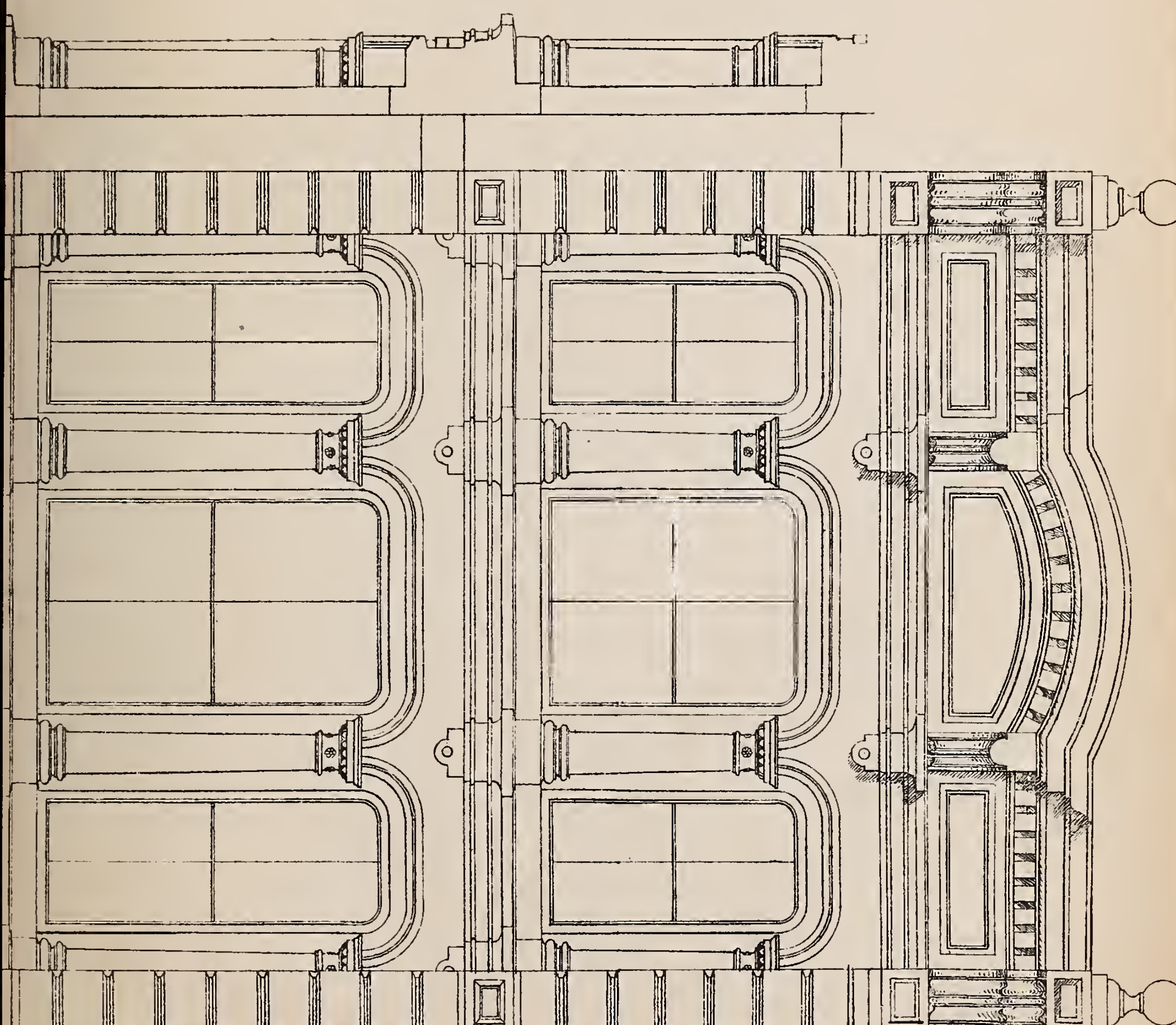
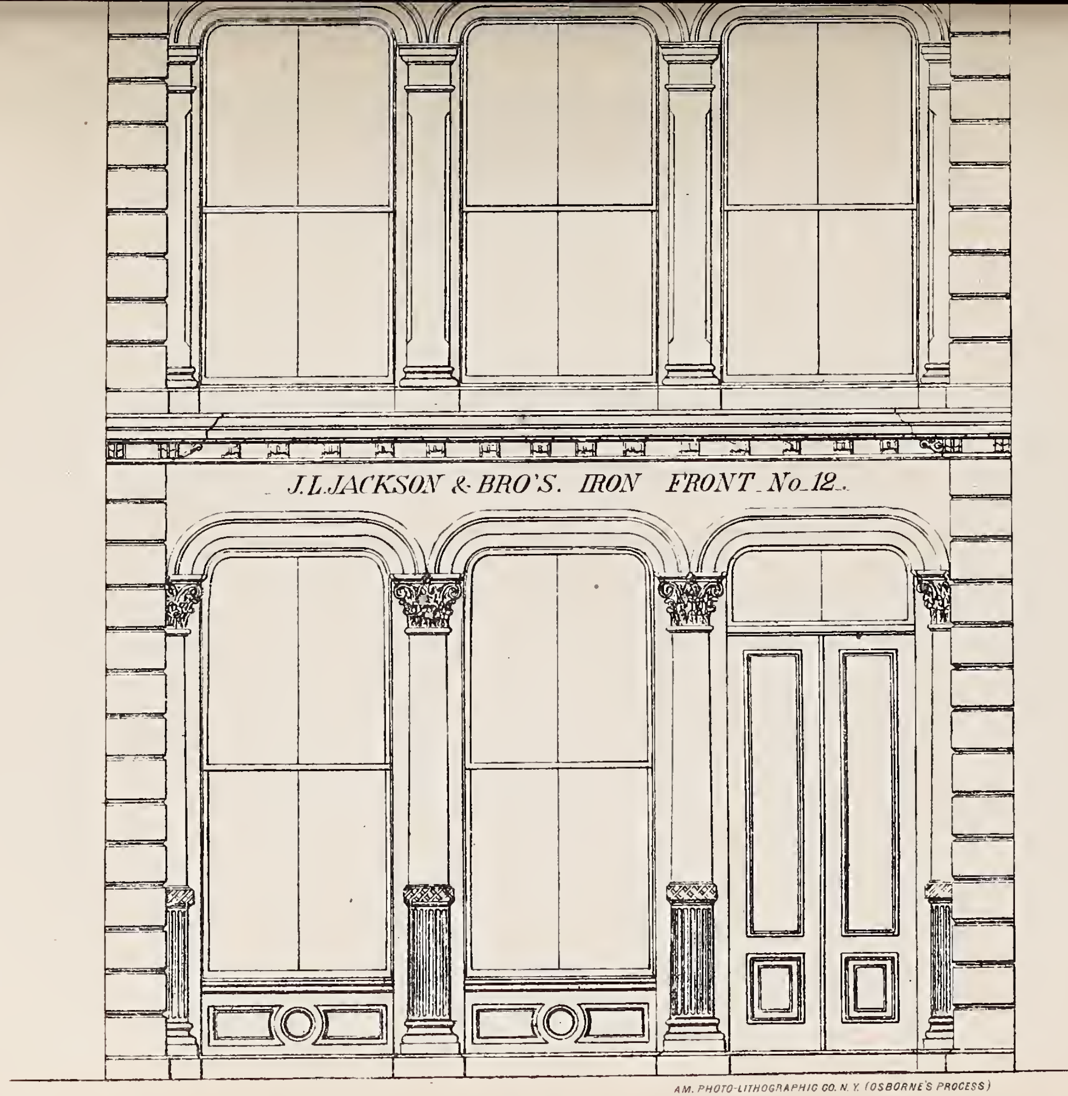
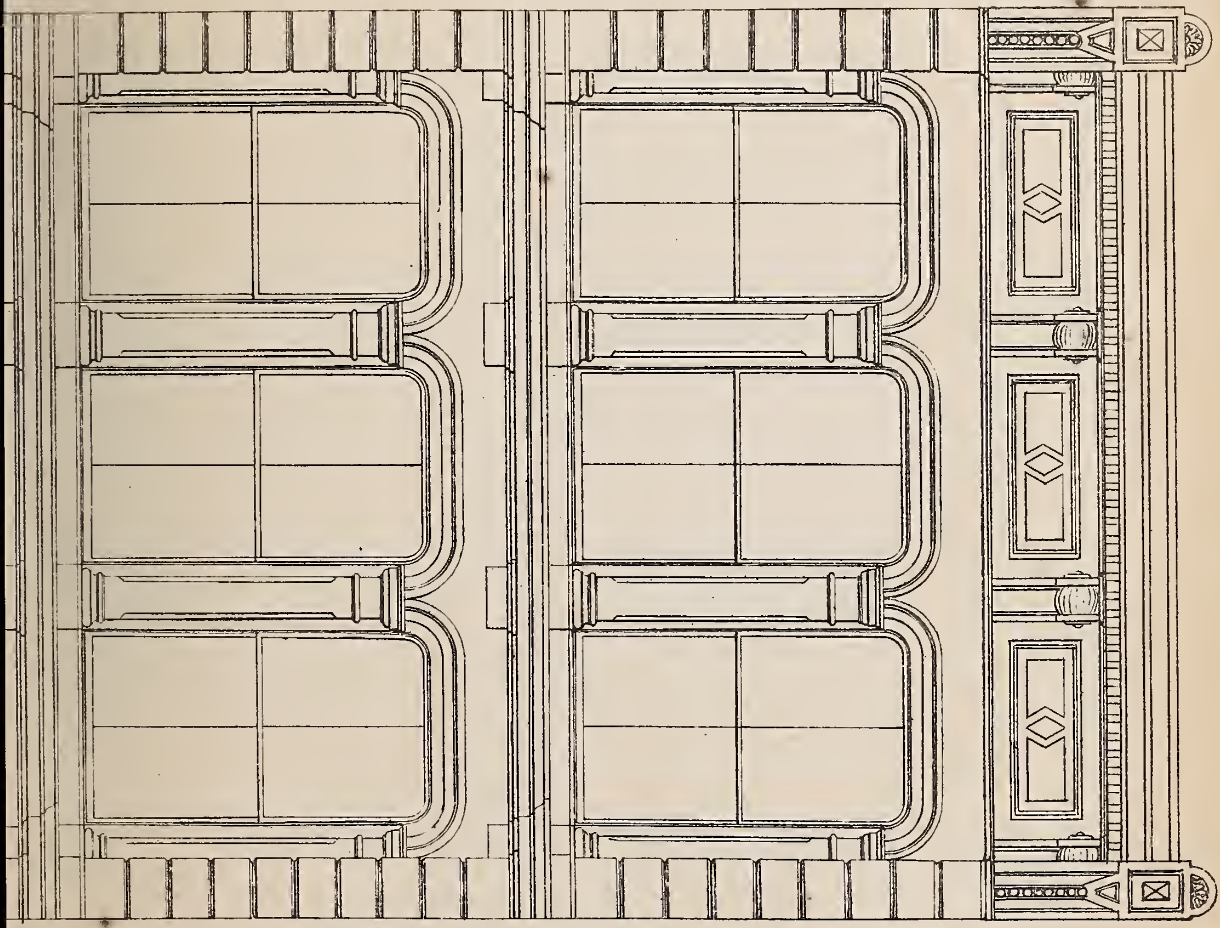
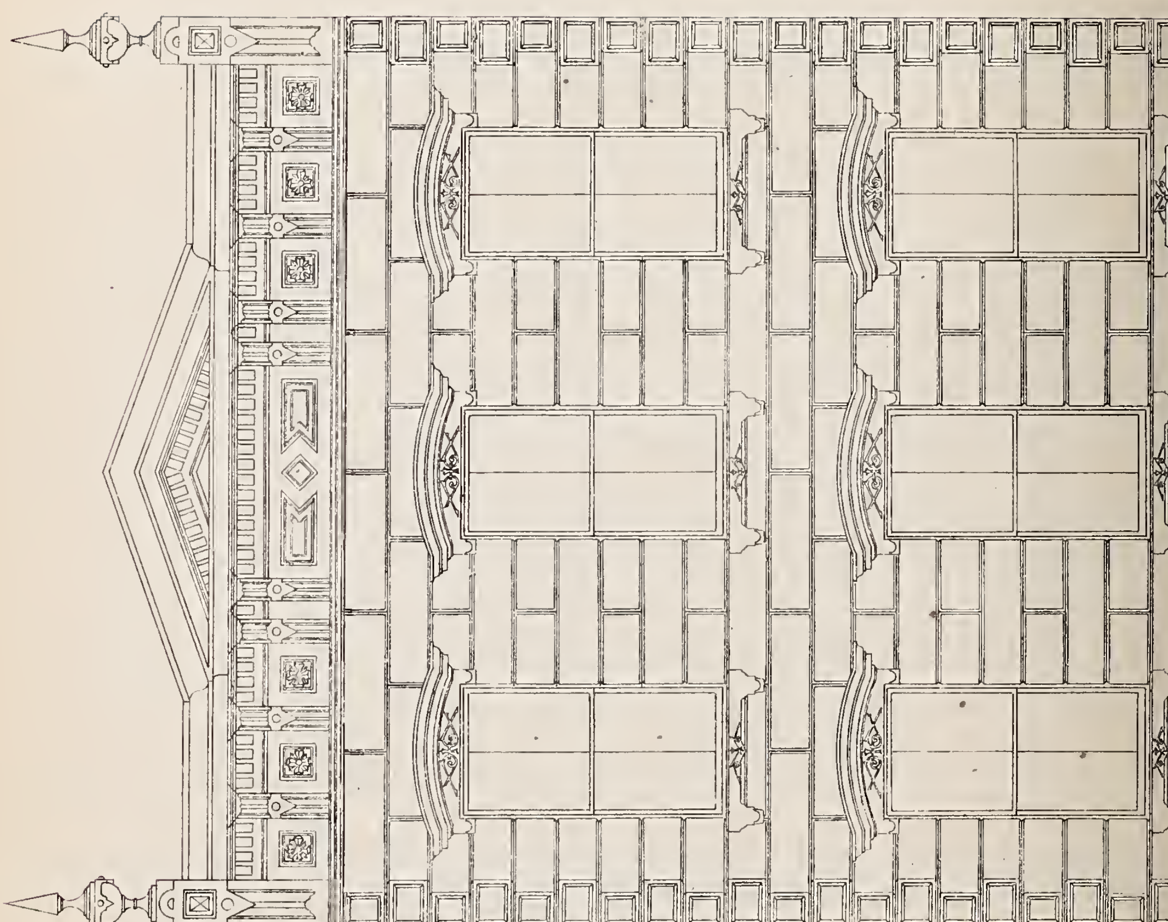


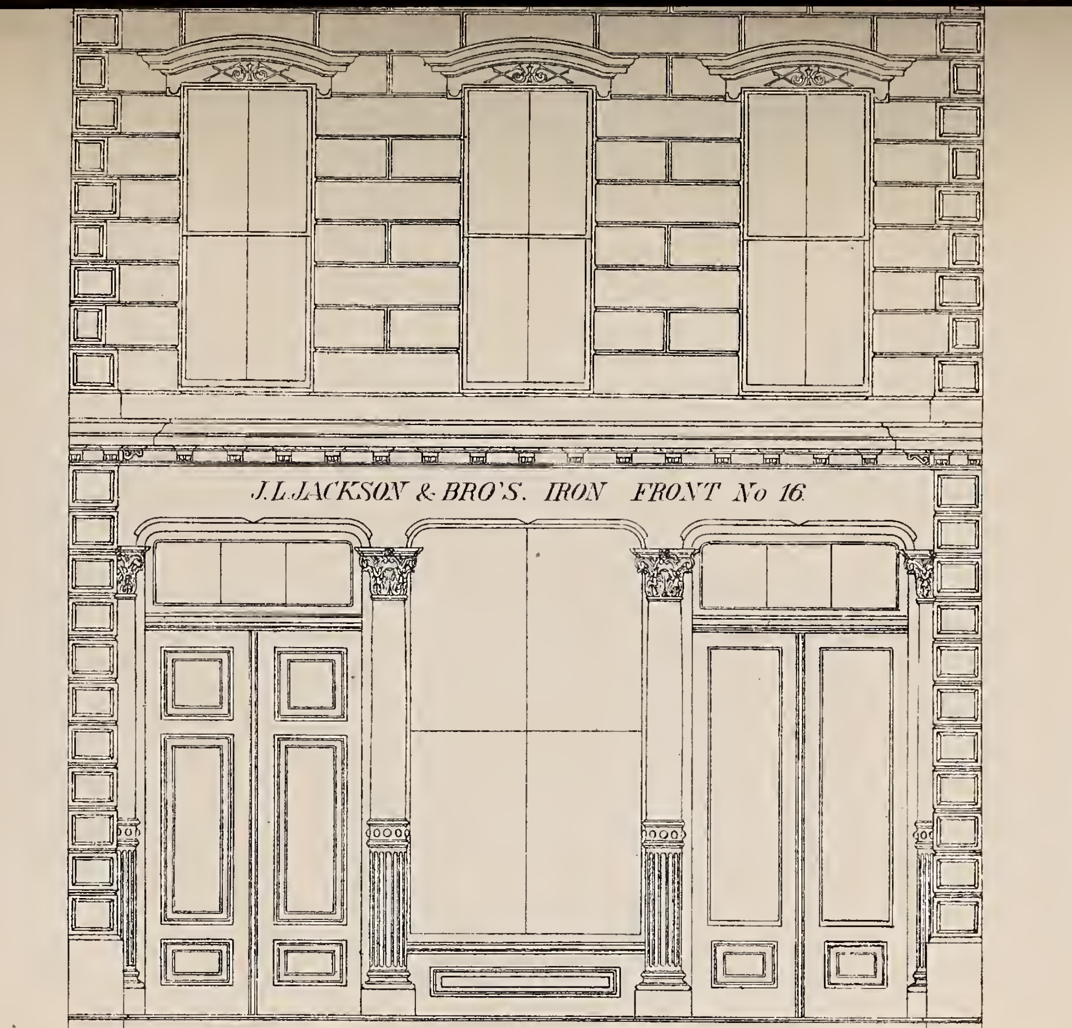


JAS. L. JACKSON & BRO'S IRON WORKS.

EAST 28th STREET 2nd AVENUE & EAST 29th STREET NEW YORK.







AM. PHOTO LITHOGRAPHIC CO. N. Y. (OSBORNES PROCESS.)

JAS. L. JACKSON & BRO'S IRON WORKS.

EAST 28th STREET 2nd AVENUE & EAST 29th STREET NEW YORK.

Below is a copy of the Report for the year 1871, made by the author of this book to the Superintendent of Department of Buildings of New York:

NEW YORK, *January 2d, 1872.*

JAMES M. MACGREGOR, ESQ.,

Sup't of Department of Buildings, New York City.

SIR: Eight months have elapsed since the enactment of the revised building law, passed by the last Legislature.

Agreeably to your instructions, I report the results of proceedings in carrying out its provisions, relating to Iron Work used in the erection and alteration of buildings, during the last six months, the length of time which I have been connected with your department.

The increasing preference for iron work in architectural structures, is a feature worthy of note in the history of modern practical science, and during the last six years this subject has received a most rapid development in this city.

The use of iron for fronts and for the interior of buildings, where heavy weights are to be sustained, at great span and upon seemingly fragile supports, in order to be of the least obstruction in space as well as to afford access to light and air, is now made not only on a scale of greater magnitude, but with much more pleasing effect than ever before.

Such an apparent anomaly is due to the peculiar capacity of iron for being shaped into such dimensions and forms as shall meet the requirements of the best architectural effect, as well as to the valuable property of its great inherent strength.

Corresponding to the rapid progress made in the use of iron for one architectural structures, it has become of great importance that proper safeguards should be extended to the occupants of our stores, warehouses and factories, as well as our tenement houses having stores underneath, in the construction of which cast iron is largely employed.

The law, as it now exists, and when properly enforced, militates against the use of iron beams, girders or lintels which span large openings and sustain heavy weights, unless it is ascertained by practical test in each case, what they can safely bear.

For beams, columns, lintels and girders of less than eight feet span, provision is made by this law, that their proper safe bearing weight shall be ascertained by mathematical calculation from the formula given by Hodgkinson, Fairbairn, Barlow and Tredgold, or the authorities at West Point.

For the solution of these formulæ considerable familiarity with mathematics is requisite, and the calculation becomes onerous to many persons who have not sufficient mathematical education to enable them to work out these problems. Hence proportions are often assumed in accordance with usual custom, and without recourse to the formula to meet every case that necessity may demand. To this may be attributed the many failures of parts of the iron work used in buildings previous to the enforcement of the present law.

Professor Fairbairn says in his work on the Application of Cast and Wrought Iron Work for Building Purposes:

"A crystaline metallic body like cast iron, when used for the supports of floors or other heavy weights subject to transverse strain, such as beams and girders, should be used with the greatest caution, and only under the direction of competent persons

thoroughly acquainted with its physical and other properties as well as its power of resistance under different strains.

"In order to insure safety and attain success in this respect, the following qualifications are necessary in the person who undertakes the construction of iron work of this kind:

First.—A knowledge of the properties and application of the material when subject to three distinct species of strains, namely, torsion, compression and separation or tearing the parts asunder.

"*Secondly.*—An exact knowledge of the proportion of the parts of a beam or girder so as to have the forces of extension and compression duly balanced when the beam is about to undergo rupture from transverse strain.

"*Thirdly.*—A knowledge of the laws which gives the expansion and contraction of metals, in order to insure sound castings and an equal degree of tension during the process of cooling."

Shortly after my appointment as Inspector of iron work in the Department of Buildings, my attention was directed to a row of tenements in course of erection on First Avenue, between 40th and 41st Streets, in which 110 cast iron beams were to be used. Thirty of these were already at the buildings. The yards of these tenements were to be, instead of in the usual place, on the top of the buildings, and to be supported by brick arches, which were to rest on the iron beams just referred to. Surmounting these arches were to be sixteen inches thickness of earth, and again above this, flagging. Thus it will be seen there were to be 110 cast iron beams on which were to rest brick arches, then earth and some stone; all of which was exclusive of the contingent weight of whatever number of persons might stand above. This arrangement of yards is similar to those at the Heights' Ridge in Brooklyn, near the South Ferry, where an accident occurred some years ago with attendant loss of life. Upon calculation in the presence of the owner, I found each beam had to sustain twelve tons. The breaking weight, according to actual test, was fourteen tons, and the deflection over three (3) inches. The maximum safe weight was four and two thirds tons, or one third the breaking weight, which is the safe load according to Barlow, Hodgkinson, Fairbairn, and all leading authorities.

It is but proper to say that the beams came from an establishment which represented that the dimensions were amply sufficient to bear the weight to be imposed.

Had these beams been used I have no doubt that fracture would have taken place before the whole weight had been imposed, as some of them were not so perfect as the two selected by the founder for test. Being loaded so near their breaking weight, and exposed to atmospheric changes, they would almost certainly have given way.

Among the many accidents which have occurred in this city during the last few years, occasioned by frail or imperfect iron work, I have taken from the records of the Department of Buildings for *twenty months* previous to the new enactment, the following as an evidence of the great necessity which existed to amend and extend the provisions of the building law.

At Number 185 Laurens Street, now called South Fifth Avenue, a cast iron girder having connected with a wrought iron tension rod, broke. It was used to sustain the front wall of a four story brown stone front building. Having broken, it let down the entire wall into the cellar, and came near killing the master mason and a laborer. Their escape was due to the fact that the tension rod did not part until at least a second after the girder broke. The investigation that followed elicited the fact that a cause of the accident was a flaw in the casting. Besides it was not of suitable form to sustain the weight imposed. The flaw was cemented over, and painted in common with the rest of the surface of the girder.

Had there been a practical test at first of the weight which the girder would safely sustain, the accident would not have occurred. In conformity to the requirements

of the building law as it then existed, this girder was conspicuously marked capable of safely sustaining a *weight of 150 tons*, but when it broke, the weight it was actually sustaining at the time was only *about 46 tons*.

After the accident at No. 185 Laurens Street, attention was directed to a girder similar to that which broke, at No. 189 Laurens Street. It was found this girder had deflected ¾ of an inch, and evidently there would soon have been another accident like at No. 185, which was prevented by the prompt use of an intermediate support.

At 340 Sixth Avenue, 25 feet north of 21st Street, a cast iron beam broke. Fortunately after the accident the wall above was sustained by a brick arch which lay directly over the beam.

In the immediate vicinity of 71st Street and Third Avenue, a lintel broke in a building which was one of five alike. The front wall was needled up in the usual manner, and the broken lintel taken ont and replaced by a stronger one.

At Nos. 238 and 240 East 30th Street, there were some very light lintels which had deflected considerably; so much so that columns had to be placed intermediate the supports.

On the northwest corner of Third Avenue and 103d Street, two lintels made apparently of scrap iron, which were supporting the front walls of two buildings broke, and had to be replaced by stronger ones.

During the period of these accidents, 20 months, it was discovered in about twenty different places according to the record, that beams, lintels and girders had seriously deflected, and intermediate supports had become imperatively necessary between the spans of the openings.

Then again, there were instances where beams, lintels and girders were delivered at the buildings, and their use was prevented by the Department of Buildings, as being too frail to sustain the load to be imposed.

Under the old law there was nothing to substantially prevent accidents like those cited, from continuing to occur.

In England, on account of the many and fatal accidents caused by the breaking of iron beams and girders, a law requiring that they shall be tested before use has been enforced for many years.

In this connection I would make the following quotations from one of the leading authorities in that country, on the construction of iron work for buildings:

"Notwithstanding the increased security which has been gained by these improvements in the form of cast iron beams and girders, their use is nevertheless attended with danger, when either the design or construction is left to *ignorant persons*; and the numerous and fatal accidents which have occurred at various times, and which have very naturally created in the public mind serious apprehensions as to their security, have almost invariably been traced to this cause. On more than one occasion as many as from fifteen to twenty lives have been lost by the failure of these beams in factories and buildings where numbers of people are congregated, and the aggregate loss of life and property from this cause has been very serious. One of the most alarming accidents of this kind happened at Oldham, on the 31st of October, 1844, in consequence of the breaking of one of the beams of a cotton factory. In this case upward of twenty persons were buried in the ruins. Among many other catastrophes of the same nature, may also be instanced Mr. Nathan Gough's mill at Salford; also Mr. Grey's mill at Manchester, &c."

During the six months in which the law has been enforced in this city, there have been tested by hydraulic pressure, or by loaded pig iron,

72 Box Lintels,
67 Hodgkinson Beams,
224 Fairbairn of 1825 form of Beams,
191 Arch Girders with Tension Rods,
22 Wrought Iron Girders,

at the following places,

J. B. & J. M. Cornell's Iron Works,
Ayers & McCandless' Iron Works,
Ætna Iron Works,
Thomas McGuiness' Iron Works,
James L. Jackson & Brother's Iron Works.

Of this number 1 Box Lintel, 4 Fairbairn of 1825 form of Beams and 9 Arch Girders have been found insufficient to bear the weight required to be imposed when in the building, by reason of their great deflection, and by having a permanent set.

1 Fairbairn of 1825 form of Beams, and 3 Arch Girders have broken, in the east iron portion, during the tests.

August 16th last, an Arch Girder made for building in Sixth Avenue, between 52d and 53d Streets, having a $2\frac{1}{2}$ inch round tension rod, and which was to sustain 59 tons, was testing for Boyce and McIntyre, founders of fair reputation for making good work. During the test the rod parted in the weld, when but twelve tons pressure had been applied on the middle of the girder.

The cause of this was an imperfect weld, which it was impossible to detect other than by a practical test, as from outward appearances the weld seemed to be as perfect as any other part of the rod.

This rod would have resisted a tensile strain, agreeably to experiments made by leading authorities, up to 117 tons, but, as mentioned, it parted at 12 tons, at the weld, or about one tenth of the strain required to pull it asunder at any other part of the rod.

It is obvious that had not the test been applied, there would have been an accident, and probably attendant loss of life at the building before the whole load had been laid upon the girder.

October 11th, 1871. During the test of a cast iron Arch Girder at the foundry of Ayres & McCandless in west 45th Street, the rod parted when two tons had been applied, also caused by an imperfect weld. The rod came near breaking the leg of the inspector who was supervising the test. This rod should have parted at a tensile strain of about 72 tons. It was $1\frac{3}{4}$ inches square, and the girder was required to hold up 24 tons in the building. Upon examination of the broken parts the iron was found burnt, but to all appearance, previous to the fracture, no indication was visible of an imperfect weld.

On the 24th of November last my attention was directed to two buildings on First Avenue, between 40th and 41st Streets, which had iron lintels supporting the brick front above. The length of these lintels in one piece was the entire width of the building, but intermediate supports were placed beneath, making the largest openings just under the length of span required by law for the test. These were placed in the building previous to my connection with the Department.

Both of the lintels broke, one of them near the middle, the other on the side, both the openings having the greatest span. On investigation it was found that, by reason of the great length of each and the unequal distribution of metal, they did not bear properly at the intermediate supports, but curved upward in one case nearly one inch.

The space between it and the top of the column, in some cases $1\frac{1}{8}$ inches, was filled up with mortar and slate—not a proper support.

These lintels were ordered to be taken out and others substituted.

I would here state that the use of iron lintels where the back flange does not have the same height as the front one, should be disapproved of when they are required to sustain heavy weights and where the span is not great enough to require them to be tested.

On the 29th of November last my attention was called to an arch girder with

wrought iron tension rod, in the building southeast corner Sixth Avenue and 56th Street, which had broken during the preceding night when the thermometer had fallen 22 degrees in a few hours. This girder was 25 feet span and supported a three story brown stone front wall, 16 inches thick, and a mansard roof, making a load of 60 tons. It was conspicuously marked to sustain with safety 125 tons, and was erected before the enforcement of the testing law. The rod parted by reason of a bad weld and being loaded to about its breaking weight, the extreme variation in the temperature hastened its rupture. This front will have to be needled up, and the girder replaced by another, which will involve considerable expense.

The number of iron fronts and interior iron work supporting brick and stone walls, floors, &c., erected during the enforcement of the new law has rendered this branch of the Department of Buildings of much usefulness.

Some animadversion has been made at the early part of the enforcement of the new building law, particularly in respect to that portion requiring girders, beams, &c., to be tested in order to ascertain their capacity for carrying the loads necessary to be borne.

The Department was considerate of the fact that most of the iron manufacturers had contracts incompleted, which were made prior to the passage of the law, and permitted nearly three months to elapse before enforcing it. In this interim it was deemed that there was sufficient time for them to become fully prepared to properly respond to the new statute. But the opposition manifested has been usual in past times, as well as the present, to many of our most valuable laws for the protection of life and property.

Also, I think it proper to state in conclusion, that some have expressed a doubt as to the utility of testing girders, beams and lintels, as they may be strained during the test. But it is known to be a fact by all who have studied and experimented in this branch of science, that when a pressure is exerted which does not go beyond the *limit of elasticity*, which is indicated by the gauges, no permanent set can ensue.

Respectfully submitted,

PETER H. JACKSON,

Inspector of Iron Construction.

Cast Iron Arch Girders,

WITH

WROUGHT IRON TENSION RODS.

A cast iron arch girder is considered as a long column subject to a certain amount of bending strain, and the resistance will be governed by the laws affecting the strength of beams, as well as those relating to the strength of columns. By reason of the slight curvilinear form of the cast iron arch girders, so much in general use, they will not compare as favorably with the laws governing columns as with those governing beams.

The metallic arch in one piece differs materially from a stone or brick arch. In the latter, by the use of separate blocks, the capacity of the material to resist compression only is exerted; while, with the use of an arch of any material in one piece, both extension and compression are brought into play.

A stone or brick arch is an arrangement of blocks (*voussoirs*) set in a curvilinear form, each block separate from the other, and subject only to compression. The greater the weight placed upon the arch, the more compressed and compact these *voussoirs* become. Their resultant pressure, or the thrust of the arch, is received by piers or abutments at the extremities; and, should a slight yield of the abutment take place, it would only cause a further setting of the *voussoirs*, and not affect the strength of the arch in the same degree that would be caused by the elongation of the wrought iron tie rod in a cast iron arch girder, as the deflection of the latter is not great before rupture takes place, and a slight elongation of the rod causes considerable deflection.

Most materials used in the construction of arches have a much greater capacity to resist compression than to resist extension; and it is obvious that this system of *voussoirs*, when made of a material whose resistance to compression is greater than to extension, has an advantage over those in which the material is used in one piece. As wrought iron possesses the property of greater resistance to extension than to compression, its use is analogous to that of a tie rod.

In the cast iron arch girder, both extension and compression are exerted, as on a straight beam, and these are the greatest at those points which are most distant from the neutral axis of cross section; hence the point of rupture will occur at one of these two extremes.

In cast iron, the resistance of compression is to that of extension in the ratio of six and a half to one; and, being a rigid, crystalline, unmalleable substance, weak in its resistance to extension as compared to that of compression, it becomes a matter of

calculation, which should be based upon experiment, to adjust the malleable wrought iron tie, which has a certain degree of extensibility, coming into play in proportion as the girder is loaded. These girders, as ordinarily constructed, have the arch or

casting in one piece, with grooves at the ends to receive the wrought iron tie rods; the latter, being a little shorter, are expanded by heat and then placed in position in the casting, and allowed to contract in cooling, to tie the bottom of the casting, thus acting as an abutment to receive the horizontal thrust of the arch. If the tie rod should be too long, it does not receive the full proportion of the strain until the cast iron has so far deflected that its lower edge is subject to a severe tensile strain which cast iron is feeble to resist.

If, as is more frequently the case, the tie rod is made too short, it is subject to severe initial strain, which is added, to the strain proper induced by the load, to produce rupture. Wrought iron is extended about a one thousandth part of its length by every ten tons of direct strain per square inch of cross section, which is the limit of elasticity of the best iron, as eight tons per square inch is for ordinary iron. Therefore, a cast iron arch girder, with wrought iron tension rod, cannot be considered as an elastic arch confined between fixed abutments.

The usual careless manner in which these wrought iron tie rods are adjusted to the cast iron arches, ordinarily one quarter of an inch and occasionally three eighths of an inch less in length than the recess made in the casting for their reception, thus detracting from their capacity to resist strain and causing the cast iron arch to camber or the rod to elongate—usually both—with want of knowledge of the proper proportion of the cast iron arch to the tie rod, imperfect castings, bad welds, and great atmospheric changes, are the causes of the several failures of these girders in this city during the past few years. The last case of this kind occurred in a building on the southeast corner of 56th street and Sixth avenue, New York, on the 28th of November, 1871. The thermometer had fallen 22° in a few hours, and the three inch rod of the girder parted at the weld. This girder, whose distance between the supports was about 25 feet, was marked to sustain 125 tons, and broke with a load of about 60 tons. It was set up in the building just before the enforcement of the law requiring it to be tested.

In view of these facts, and the observations I have made in testing about 220 of these girders, I conclude that, as ordinarily made, in proportioning the wrought iron tie to the cast iron arch, one square inch of cross section of tie rod should be allowed for every ten net tons of load imposed upon the span of the arch. Regarding the arch as flexible, or as possessing no inherent stiffness, and the tie rod as a chord without weight, the following formula is proper:

Let S equal span in feet; V the versed sine in feet; U the uniform load per foot of span; H the horizontal thrust or strain; then

$$H = \frac{U\,S^2}{8V}$$

PRICES AND LENGTHS OF CAST IRON ARCH GIRDERS

with Wrought Iron Tension Rods, to support 4 stories of 16 inch brick wall, not to exceed a height of 50 feet, exclusive of the weight of floors or any other weight.

Should the weight of wall, by a pier, be brought at or near the centre of girder, one of greater sustaining capacity should be used.

The weight given below is that which each girder will safely sustain as *a distributed* load—

EXAMPLE:

How to ascertain the load to be borne—on a girder whose length is 30 feet and span 28 feet, and height of wall, 50 feet,—a cubic foot of brick work weighing 112 pounds—a foot of wall 16 inches thick will weigh 150 pounds.

28 feet × 50 feet = 1,400 feet × 150 pounds = 210,000 lbs. = 105 net tons.

No.	Whole Length of Girder.	Span. SAY—	Weight of Brick Work.	PRICE.
158	30 feet.	28 feet.	105 Net Tons.	$364 00
159	29 "	27 "	$101\frac{1}{4}$ "	337 00
160	28 "	26 "	$97\frac{1}{2}$ "	314 00
161	27 "	25 "	$93\frac{3}{4}$ "	280 00
162	26 "	24 "	90 "	264 00
163	25 "	23 "	$86\frac{1}{4}$ "	238 00
164	24 "	22 "	$82\frac{1}{2}$ "	225 00
165	23 "	21 "	$78\frac{3}{4}$ "	215 00
166	22 "	20 "	75 "	205 00
167	21 "	19 "	$71\frac{1}{4}$ "	195 00
168	20 "	18 "	$67\frac{1}{2}$ "	180 00
169	19 "	17 "	$63\frac{3}{4}$ "	171 00
170	18 "	16 "	60 "	163 00
171	17 "	15 "	$56\frac{1}{4}$ "	151 00
172	16 "	14 "	$52\frac{1}{2}$ "	140 00

For Shorter Girders use Straight Girders. See page 22.

To sustain 3 Stories, or 38 feet high, of 16 inch brick wall.

No.	Whole Length of Girder.	Span SAY—	Weight of Brick Work.	PRICE.
173	30 feet.	28 feet.	$79\frac{3}{4}$ Net Tons.	$312 00
174	29 "	27 "	77 "	288 00
175	28 "	26 "	$74\frac{1}{8}$ "	264 00
176	27 "	25 "	$71\frac{1}{4}$ "	237 00
177	26 "	24 "	$68\frac{1}{2}$ "	227 00
178	25 "	23 "	$65\frac{1}{2}$ "	218 00
179	24 "	22 "	$62\frac{3}{4}$ "	207 00
180	23 "	21 "	$59\frac{7}{8}$ "	190 00
181	22 "	20 "	57 "	180 00
182	21 "	19 "	$54\frac{1}{4}$ "	172 00
183	20 "	18 "	$51\frac{1}{4}$ "	161 00
184	19 "	17 "	$48\frac{1}{2}$ "	154 00
185	18 "	16 "	$45\frac{3}{4}$ "	148 00
186	17 "	15 "	$42\frac{3}{4}$ "	142 00

4 Stories, or 50 feet high, of 12 inch brick wall.

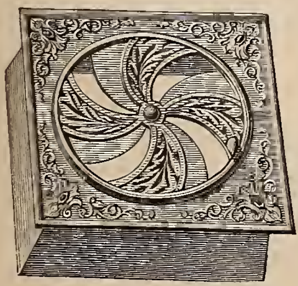
No.	Whole Length of Girder.	Span. SAY—	Weight of Brick Work it Sustains.	PRICE.
187	30 feet.	28 feet.	$78\frac{1}{2}$ Net Tons.	$290 00
188	29 "	27 "	$75\frac{3}{5}$ "	264 00
189	28 "	26 "	$72\frac{3}{4}$ "	232 00
190	27 "	25 "	70 "	219 00
191	26 "	24 "	$67\frac{1}{4}$ "	210 00
192	25 "	23 "	$64\frac{1}{2}$ "	201 00
193	24 "	22 "	$61\frac{3}{5}$ "	186 00
194	23 "	21 "	$58\frac{3}{4}$ "	178 00
195	22 "	20 "	56 "	169 00
196	21 "	19 "	$53\frac{1}{4}$ "	162 00
197	20 "	18 "	$50\frac{1}{2}$ "	153 00
198	19 "	17 "	$47\frac{1}{2}$ "	145 00
199	18 "	16 "	$44\frac{3}{4}$ "	138 00
200	17 "	15 "	42 "	131 00

For Shorter Girders use Straight Girders. See page 23.

3 Stories, or 38 feet high, of 12 inch brick wall.

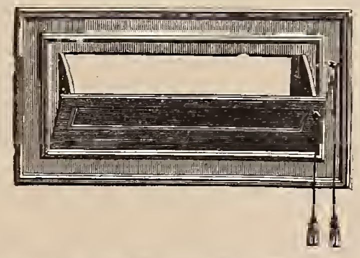
No.	Whole Length of Girder.	Span. SAY—	Weight of Brick Work.	PRICE.
201	30 feet.	28 feet.	$59\frac{6}{10}$ Net Tons.	$253 00
202	29 "	27 "	$57\frac{1}{2}$ "	232 00
203	28 "	26 "	$55\frac{7}{20}$ "	215 00
204	27 "	25 "	$53\frac{2}{10}$ "	205 00
205	26 "	24 "	$51\frac{1}{10}$ "	197 00
206	25 "	23 "	$48\frac{19}{20}$ "	184 00
207	24 "	22 "	$46\frac{8}{10}$ "	177 00
208	23 "	21 "	$44\frac{7}{10}$ "	169 00
209	22 "	20 "	$42\frac{6}{10}$ "	160 00
210	21 "	19 "	$40\frac{9}{20}$ "	150 00
211	20 "	18 "	$38\frac{3}{10}$ "	143 00
212	19 "	17 "	$36\frac{2}{10}$ "	136 00
213	18 "	16 "	$34\frac{1}{20}$ "	131 00
214	17 "	15 "	$31\frac{9}{10}$ "	120 00

For Shorter Girders use Straight Girders. See Page 23.



ROUND VENTILATOR.

5 inch,	-	per doz.,	$6 65
6 "	-	"	7 25
8 "	-	"	10 50
10 "	-	"	13 75



No. 45 Ventilator, for the introduction of Fresh Air through an external Wall, without Draft.

Size, $9\frac{1}{4}$ x $4\frac{1}{4}$, Painted..............each.............. ....$1 50
" $10\frac{1}{4}$ x $4\frac{1}{4}$, " .... " 1 94

ALSO, ENAMELED WHITE TO ORDER.

When the Ventilator is open, as shown, the incoming fresh air from without is diverted towards the ceiling, where it will spread on all sides and become warm, so that in its descent it will not cause the slightest draft, as it is a well-known fact that cold air is heavier than warm air, and descends, while the warm air ascends. It is closed and opened by a cord.

Cast Iron Flue Rings and Covers, 5 in., $5\frac{1}{2}$ in., and 6 in., - per doz., $5 75

WEIGHT OF MATERIALS.

In pounds, per Cubic Foot.

	Lbs.		Lbs.		Lbs.
Ash	50	Yellow Pine	40	Water	62½
Beech	51	Pitch "	52	Sea Water	64⅓
Box	60	Sycamore	37	New Mortar	115
Cedar	30	Walnut, American	40	Masonry Rubble	140
Cherry	38	Willow	30	Slate	180
Chestnut	36	Asphalt,—Gritted, for		Paving Stone	151
Cork	15	Roofs	156	Tar	63
Ebony	83	Brick	112	Cast Iron	450
Elm	35	Roman Cement and		Bar "	480
White Spruce	29	Sand—equal parts	112	Lead	710
Lignum Vitæ	83	Ordinary Clay	120	Pewter	453
Logwood	55	Coal, solid	80	Steel	490
Mahogany, Honduras	40	Common earth	124	Tin	456
" Spanish	55	Gravel	110	Zinc	439
White Oak	48	Quincy Granite	166		
Canadian	54	Connecticut Brown		A Superficial foot of	
Red Oak	47	Stone	170	Lath and Plastering	
Live "	76	White Marble	168	will weigh about	10
White Pine	30	Nyack Brown Stone	148		

CAST IRON.

Specific Gravity, 7.207.

Weight, per Cubic Foot, 450 lbs.

A bar 1 foot long and 1 inch square weighs $3\frac{2}{10}$ lbs.

It expands $\frac{1}{1620}$ of its length to every one hundred degrees of heat.

Melts at 3.479 Degrees.

Shrinks in cooling $\frac{1}{98}$ to $\frac{1}{85}$ of its length.

It is crushed by a force of about 93,000 lbs. per square inch.

Its tensile strength is about 15,000 lbs. per square inch.

WROUGHT IRON.

Specific Gravity, 7.788.

Weight, per Cubic Foot, 480 lbs.

It expands $\frac{1}{1430}$ of its length to every one hundred degrees of heat.

Its tensile strength for bars is 24 tons to square inch; for plates, 20 tons; the strain just sufficient to balance the elasticity of common bar iron is 8¼ tons; best iron 10 tons.

The limit of its elastic force is about $\frac{1}{1000}$ of its length.

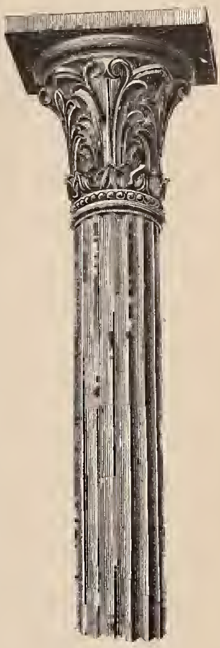
Round Fluted Columns,

WITH CARVED HEADS.

With proper Cap and Base plates. Columns, *ordinary* thickness.

4 in.	5 in.	6 in.	7 in.	8 in.	10 in.	Diam.
$1.75,	1.95,	2.65,	3.20,	4.10,	5.25	per ft.

Prices will be given for Columns of greater thickness of metal; also, for Corinthian or any other style of Columns.

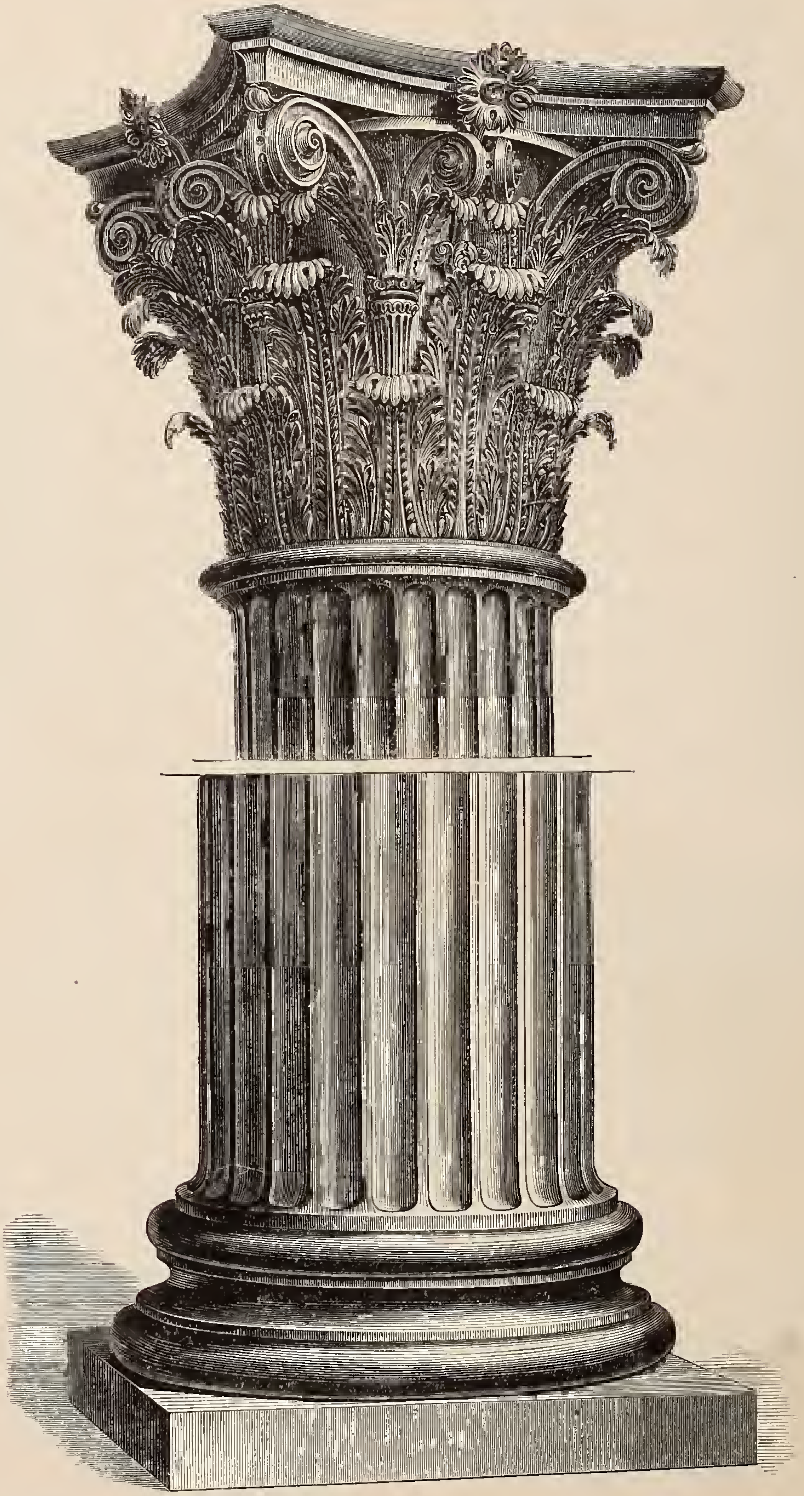


Tower of Wind Capitals.

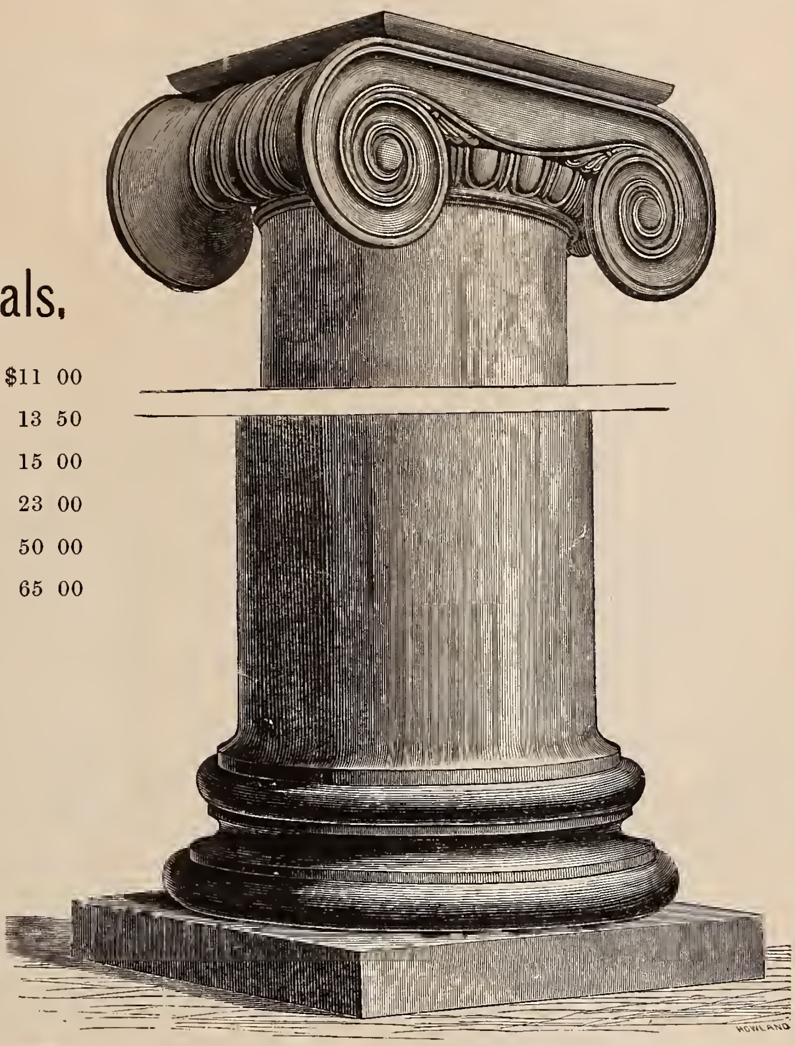
Capitals without the neck moulding as shown in illustration.

6	inches	Diameter at neck	$5 50
8	"	"	8 00
10	"	"	10 00
12	"	"	14 00
14	"	"	19 00
16	"	"	25 00
18	"	"	32 00
20	"	"	42 00
27	"	"	78 00

Iron Corinthian Capitals.



6 inches	Diameter at neck	$7 50	16 inches	Diameter at neck	$46 00
8 "	"	11 00	18 "	"	62 00
10 "	"	16 50	20 "	"	80 00
12 "	"	22 00	25 "	"	115 00
14 "	"	23 00	36 "	"	180 00



Ionic Capitals,

8 in. diam. at neck,			$11 00
10	"	"	13 50
12	"	"	15 00
14	"	"	23 00
18	"	"	50 00
24	"	"	65 00

7 in., $15 50. 8 in., $19 00.
Capitals for long columns, without Neck Moulding.

L. & T. Capitals, 7 in., $12 00
Without Neck Moulding,
8 in., 15 00

SHELL BASES,

For Wood, Iron, Stone, or Brick Columns.

6 inches diameter of Shaft				$ 3 50
7	"	"	"	4 25
8	"	"	"	4 75
9	"	"	"	5 75
10	"	"	"	6 50
12	"	"	"	7 75
14	"	"	"	9 00
15	"	"	"	11 00
16	"	"	"	13 50
18	"	"	"	19 00
20	"	"	"	22 00
24	"	"	"	28 00
29½	"	"	"	43 00
32	"	"	"	50 00

Corinthian Pilaster Capitals.

42 in.	diam	at Neck	.......$
32	"	"	.....
25	"	"	.....
12	"	"	.....
10	"	"	.....
8	"		.....

Composite and other capitals made to order.

We have other illustrations of capitals than shown in this book. Send for Sheet No. 5.

Ionic Capitals.

20 inch Ionic Capital, with enriched neck, price, $83 00.

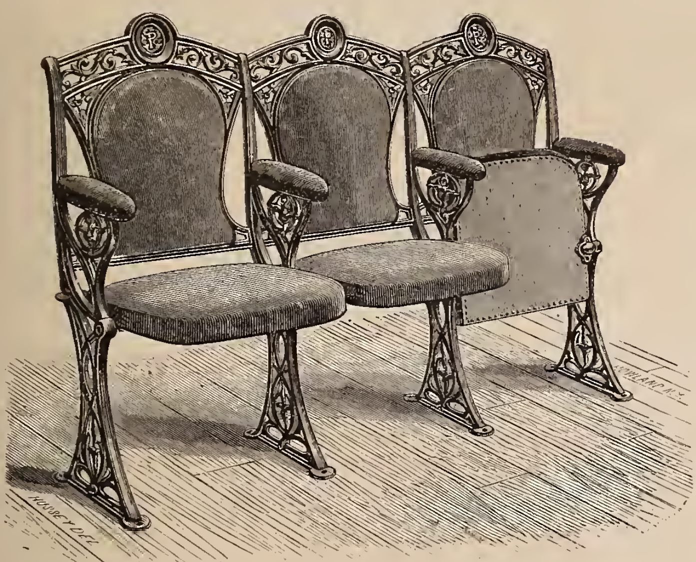
Other sizes made to order.

Ionic Capitals, with enriched neck.

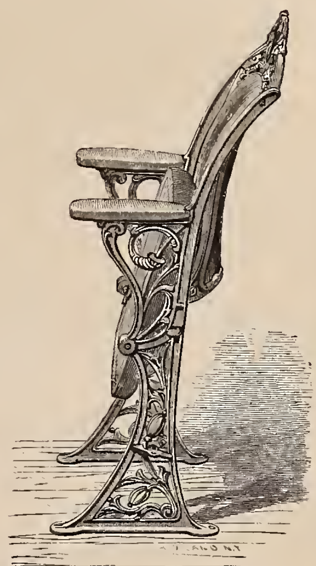
OPERA HOUSE CHAIRS,

For Theatres and Public Buildings, with Patent Turn-up Seat, to give free access.

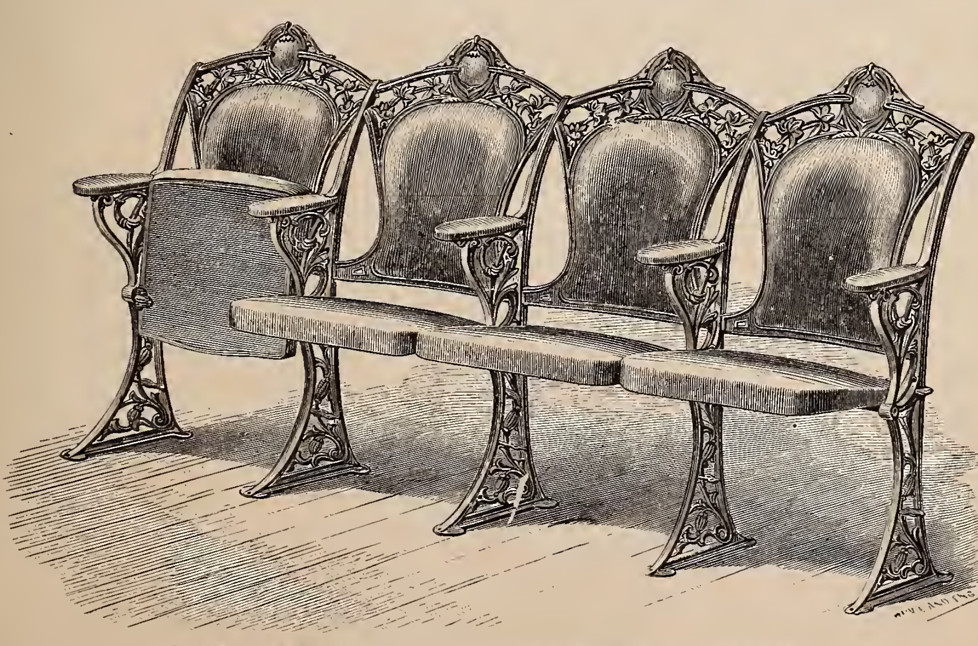
These Chairs will seat one-fifth more people in the same space, by reason of the turn-up seat, and will soon return their original cost by the increased receipts, resulting from greater accommodation, to any theatre or public building adopting them.



Chairs such as used in Grand Opera House, New York, called Pike Pattern.



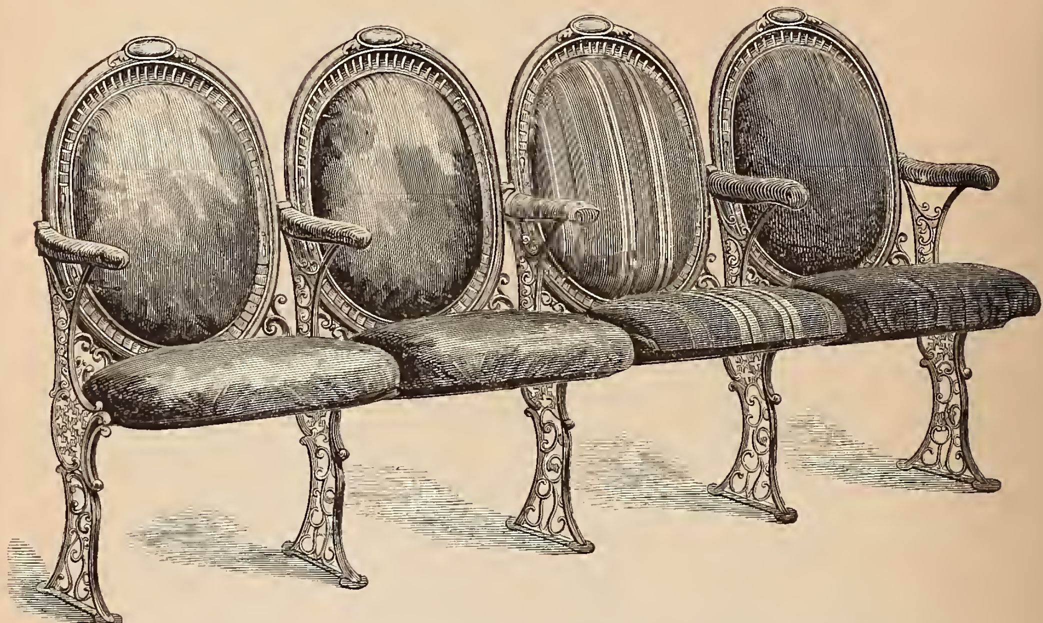
SINGLE CHAIR.
Side View of Booth Theatre Pattern, Seat turned up.



Chairs such as used in Booth's Theatre, called Booth Pattern.

OPERA HOUSE CHAIRS.

(CONTINUED.)



Chairs such as used in Cooper Institute, New York, called Cooper Institute Pattern.

Also, several other Patterns, shown on our Illustrated Sheet No. 16, which will be sent, on application

These Chairs are upholstered in any color of Plush, Leather or Imitation of Leather, Reps, Cane, &c. The iron work painted or enameled in any color. Their dimensions are usually 19 inches from centre to centre of arm, and 2 feet 6 inches from back to back They are all fitted, ready to screw to floor when they leave our establishment.

Prices given on application, stating what pattern—how many in a row—how upholstered and painted, or enameled.

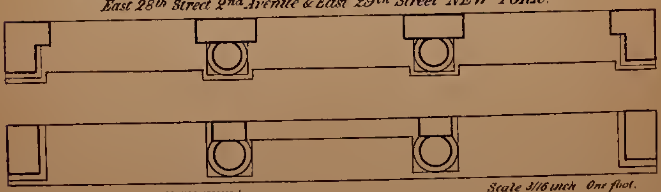
The following are some of the Places we have Furnished these Chairs:

Grand Opera House,	New York.
Booth's Theatre,	"
Fifth Avenue Theatre,	"
Cooper Institute,	"
Bryant's Opera House,	"
Union Square Theatre,	"
Theatre Comique,	"
Young Men's Christian Association,	"
Harlem Music Hall	"
Lina Edwin's Theatre,	"
Thirty-Fourth Street Theatre,	"
Varieties Theatre,	New Orleans.
Pike's Opera House,	Cincinnati.
Hooley's Opera House,	Chicago.
Plymouth Church Choir, (Rev. Henry Ward Beecher.)	Brooklyn, N. Y.
Irving Hall,	New York.
Howard Athenæum,	Boston, Mass.
Boston Museum,	" "
Dayton Music Hall,	Dayton, Ohio.
Institute of Technology,	Boston, Mass.
Mrs. Conway's Theatre,	Brooklyn, N. Y.
Dixie & Moran's Opera House,	Philadelphia, Pa.
Utica Mechanics' Hall,	Utica, N. Y.
Weiting Hall,	Syracuse, N. Y.
National Theatre,	Washington, D. C.
Terre Haute Opera House,	Terre Haute, Ind.
Galveston Theatre,	Galveston, Texas.
University College,	New York.
Young Men's Christian Association,	Washington.
Mishler's Academy of Music,	Reading, Pa.
Mercantile Library Hall,	Pittsburgh, Pa.
Elliot Hall,	Williamsport, Pa.
Academy of Music,	Hartford, Conn.
Opera House,	Wilkesboro, Pa.
Church,	Scranton, Pa.
Lecture Room,	Clifton Springs, N. Y.
Theatre,	Milwaukie, Mich.
Public Hall,	Lynn, Mass.
Opera House,	Rochester, N. Y.
Opera House,	Chelsea, Mass.
Moore's Opera House,	Newburgh, N. Y.
Englewood Athenæum,	Englewood, N. J.
Tweddle Hall,	Albany, N. Y.

MASONIC LODGE ROOMS, &c.

JAS. L. JACKSON & BRO'S IRON WORKS.

East 28th Street 2nd Avenue & East 29th Street NEW YORK.



AM. PHOTO-LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS)

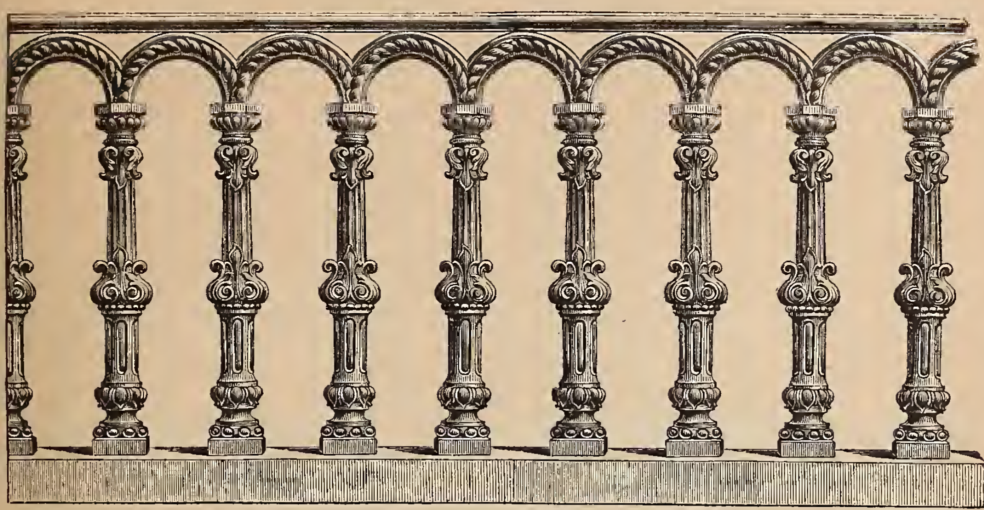
Scale 3/16 inch One foot.

PRICES OF IRON RAILING

On Illustrated Sheets 8, 9 and 10,

Not Circled or Beveled, and for a length not less than Fifty Feet.

For every Gate in the Length, $10 additional to be added. For a length under 25 feet, 10 per cent. added per foot to the prices. For a length over 25 feet and less than 50 feet, 5 per cent. to be added to the prices.



M. & T. Pattern. Made Single or Double Face. Hand Rail 5 in. wide.

No. 1. Railing	Per running foot,		$2 50....	Put up in New York,		$2 75
" 2. " J & T..........	"	"	2 65....	"	"	2 90
" 7. "	"	"	2 85......	"	"	3 10
Star Pattern Double Face........	"	"	2 85......	"	"	3 10
No. 15. Railing, J & T...........	"	"	2 75......	"	"	3 00
" 5. " "	"	"	2 75....	"	"	3 00
" 14. " "	"	"	3 10......	"	"	3 35
" 10. " "	"	"	2 80......	"	"	3 05
" 3. " "	"	"	2 95....	"	"	3 20
" 13. " "	"	"	3 05......	"	"	3 30
" 30. " "	"	"	2 85......	"	"	3 10
" 17. " "	"	"	2 80......	"	"	3 05
" 11. " "	"	"	3 00......	"	"	3 25
" 4. " "	"	"	2 80......	"	"	3 05
Shell Pattern..........................	"	"	2 70......	"	"	2 95
No. 19. Railing, J..................	"	"	3 00......	"	"	3 25
" 8. " ".................	"	"	3 05......	"	"	3 30
Acorn and Laurel....................	"	"	2 95......	"	"	3 20
No. 32. Double Face, J. & T.....	"	"	3 00......	"	"	3 25
" 19. Railing, J. & T...........	"	"	2 90....	"	"	3 15
" 75. " J. L. J...........	"	"	2 80......	"	"	3 05
" 76. " "	"	"	2 80......	"	"	3 05
" 6. Double Face Railing....	"	"	2 87......	"	"	3 12
" 3. " " J. L. J.	"	"	2 80....	"	"	3 05
" 77. Railing, J. L. J...........	"	"	2 80....	"	"	3 05
" 78. " "	"	"	2 95....	"	"	3 20
" 18. " "	"	"	3 00....	"	"	3 25

PRICES OF IRON RAILING.—*Continued.*

No. 1.	Double Face, J. L. J.	Per running foot, $3 15	Put up in New York, $3 40
" 5.	" " "	" " 3 15	" " 3 40
" 79.	Railing, "	" " 3 15	" " 3 40
" 7.	" "	" " 2 70	" " 3 05
" 17.	Double Face, "	" " 2 90	" " 3 15
" 4.	" " "	" " 3 20	" " 3 45
" 9.	Railing, "	" " 2 90	" " 3 15
" 12.	" "	" " 3 65	" " 3 90
" 13.	" "	" " 3 75	" " 4 00
" 15.	" "	" " 2 90	" " 3 15
" 55.	"	" " 3 18	" " 3 43
" 52.	Double Face Railing	" " 3 60	" " 3 85
" 69.	Railing	" " 3 30	" " 3 55
" 84.	"	" " 3 30	" " 3 55
" 3.	"	" " 3 70	" " 3 95
" 8.	" J. & T.	" " 3 65	" " 3 90
" 54.	"	" " 3 65	" " 3 90
" 55.	"	" " 3 45	" " 3 79
" 50.	"	" " 3 60	" " 3 85
" 51.	"	" " 3 30	" " 3 55
" 229.	" wrought and cast iron (see S. book).		
" 228.	" " " " " "		
M. & T. Pattern	Single Face	Per running foot, $4 75	" " 5 25
" "	Double "	" " 6 50	" " 7 00
Oriental Baluster,	Single "	" " 5 00	" " 5 50
" "	Double "	" " 7 00	" " 7 50
Heavy Roman,	P. R.	" " 4 50	" " 5 00
" "	P. B.	" " 4 25	" " 4 75
*No. 27.	Railing, wro't & c'st iron,	" " 4 25	" " 4 75
" 26.	" " "	" " 4 50	" " 5 00
" 54.	" " "	" " 3 00	" " 3 30
" 56.	" " "	" " 3 00	" " 3 30
" 58.	" " "	" " 3 50	" " 3 80
" 60.	All Wrought Iron	" " 4 00	" " 4 30

GATES EXTRA.

*For illustrations see Stable Book.

COUNTER RAILINGS,

FOR BANKS, COUNTING HOUSES, &c.

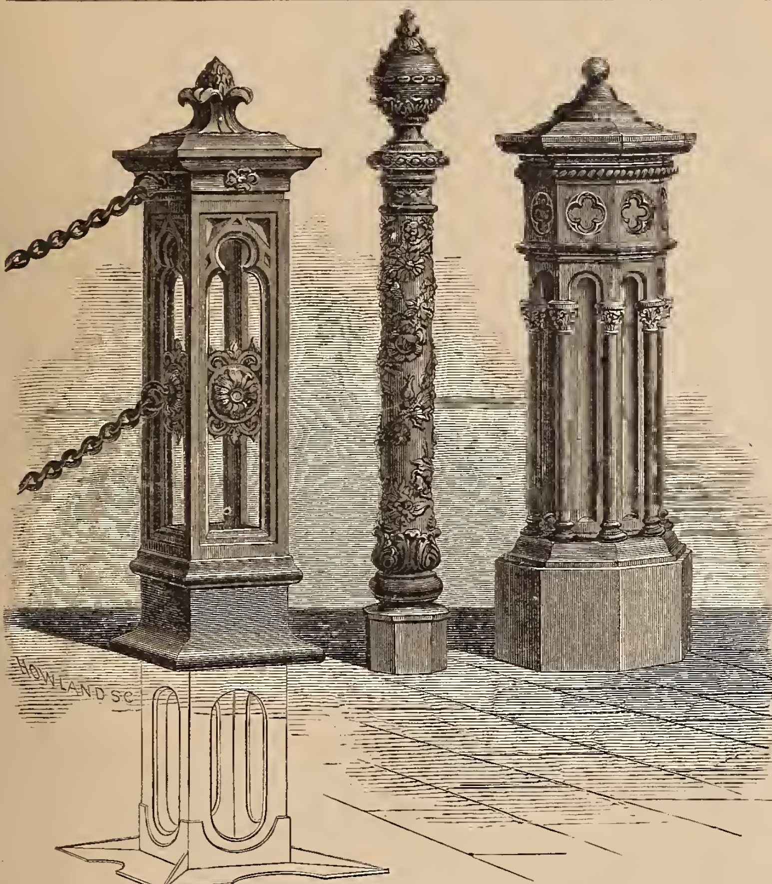
Rosette Pattern, 17 inches high,	Per running foot	$3 50
If Gates in, additional $5 each.		
Honey Suckle Pattern, 15½ inches high	" "	3 50
" " fret work at bottom, making in all 25 in. high	" "	4 50
Mechanics' and Traders' Bank Pattern, 18 in. high	" "	3 30
J. & T. Pattern, 23 in. high	" "	4 00

PRICE LIST OF IRON POSTS AND NEWELS

FOR

CEMETERIES, COURTYARDS & STOOPS.

ILLUSTRATED SHEET NO. 2.

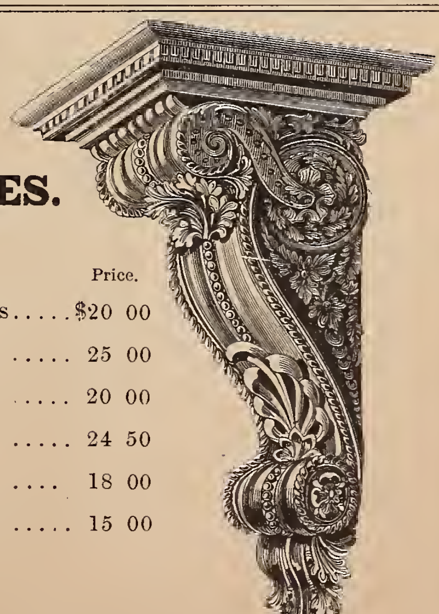


POSTS.

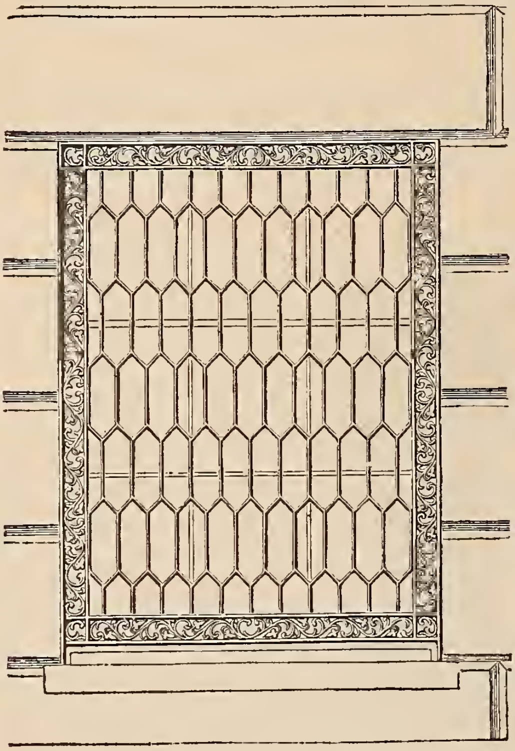
	Price.
No. 88....	$16 00
" 89....	9 00
" 90....	17 00
" 91....	16 00
" 92....	13 00
" 93....	13 00
" 98....	28 00
" 99....	16 00
" 100....	12 50
" 101....	26 00
" 102....	38 00
" 103....	14 50
" 104....	18 00
" 105....	60 00
" 106....	25 00
" 107....	22 00
" 108....	9 00
" 109....	6 00
" 110....	10 00
" 111....	6 00
" 112....	12 50
" 113....	9 00
" 114....	12 50

TRUSSES.

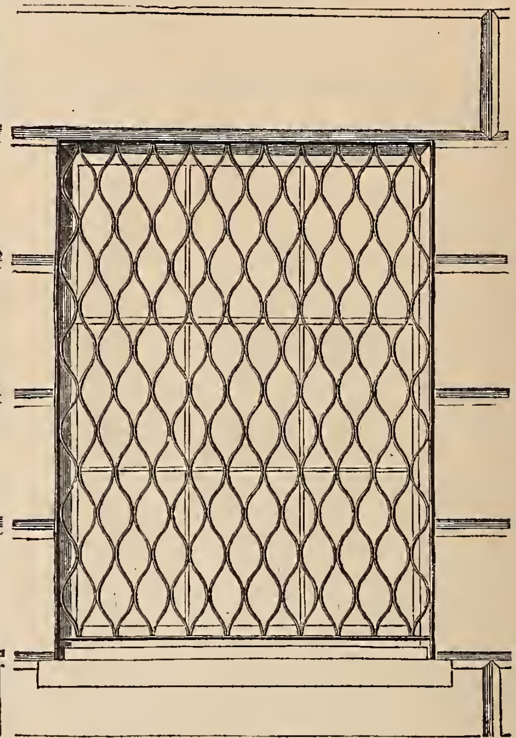
	Price.
E 1, or No. 51, Truss.....	$20 00
E 2, " 52, "	25 00
E 3, " 53, "	20 00
No. 54, Balcony "	24 50
" 55, " "	18 00
" 57, " "	15 00



WROUGHT IRON WINDOW GUARDS.



No. 93.



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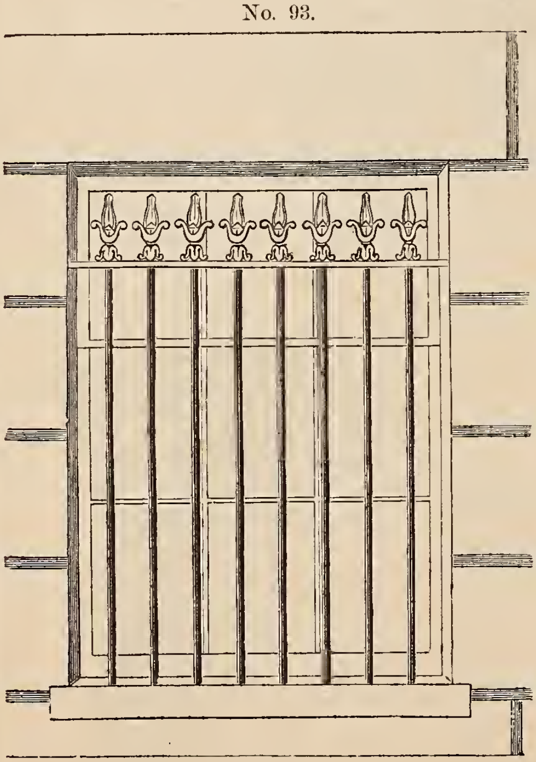
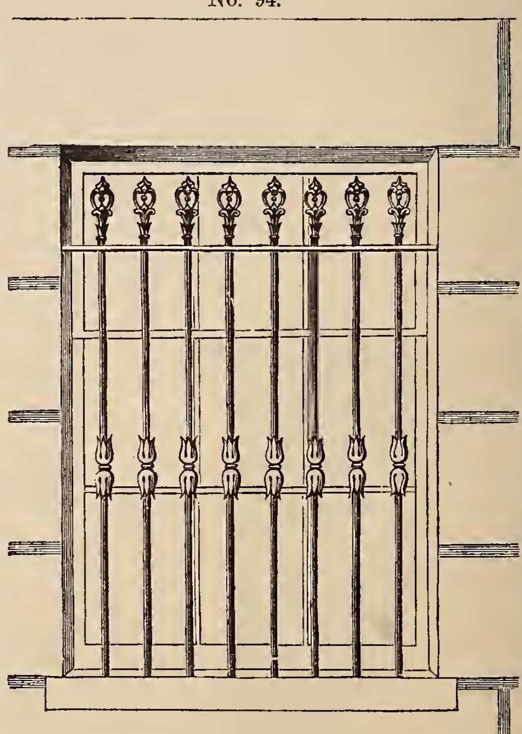


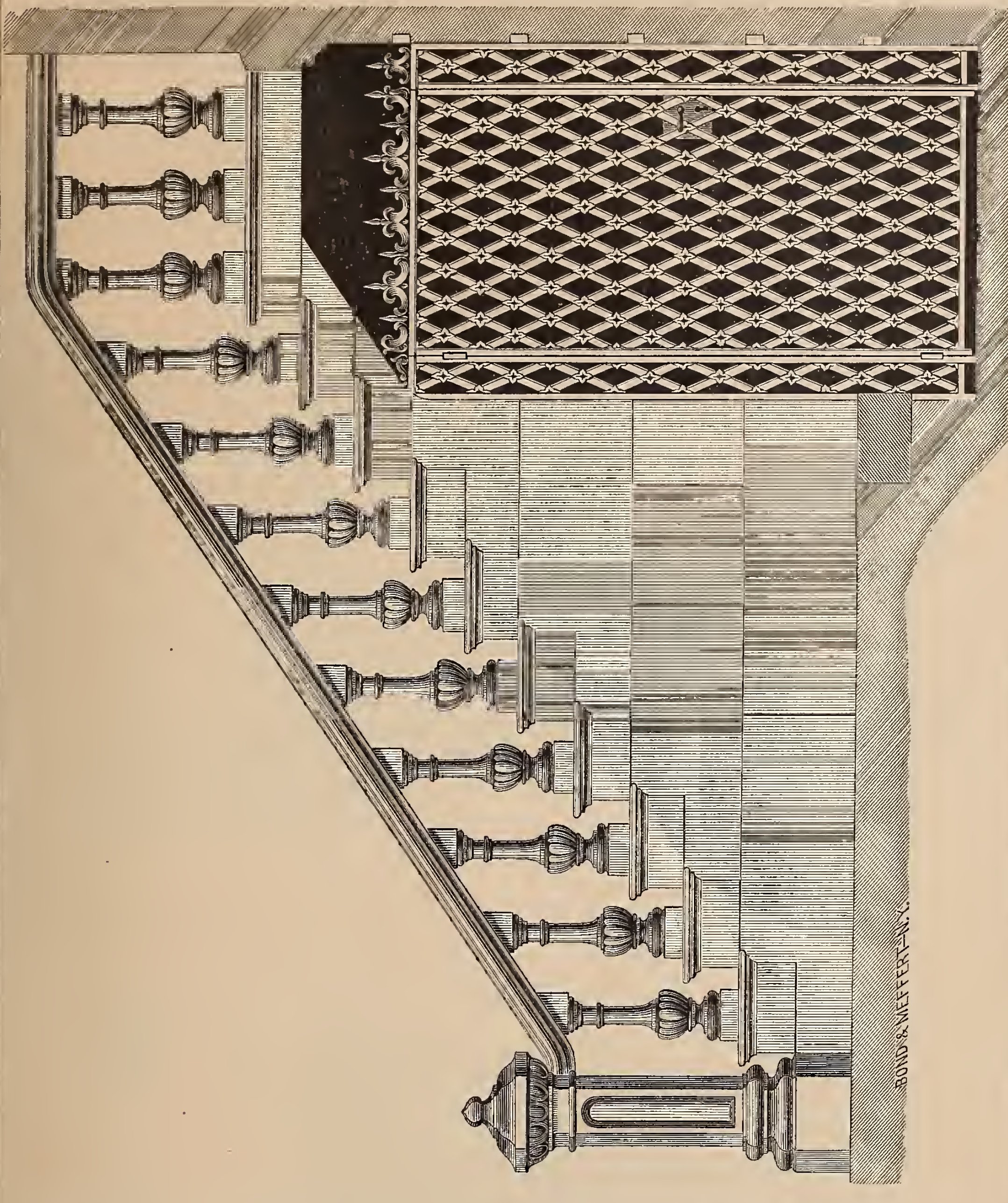
No. 96.



No. 97.

No. 90. Per superficial foot.......	$ 1 65	No. 95. Per superficial foot.......	$ 1 90
" 91. " " "	1 65	" 96. " " " $\frac{3}{4}$ bars.	80
" 92. " " "	1 40	" 96. " " " $\frac{7}{8}$ "	90
" 93. " " "	2 15	" 97. " " "	1 00
" 94. " " "	1 40	" 98. " " "	75

Put up in New York City, 10 cents additional per superficial foot.



BALUSTRADE RAILING, No. 230 Pattern, for a Stoop, as shown, Straight, (not circled), Hand Rail 8 in. wide; Balustrade 6 in. diameter. PRICE.

Per foot, not put up.................... $9 50
" put up in New York City...... 11 00
Posts, each, additional.................. 18 00

The same Railing, Straight, used for a Court Yard.

Per foot, not put up.................... 7 50
" put up in New York City....... 8 50

Gates, extra.

IRON GATE, No. 230 Pattern, ordinary size.

As shown above, including Lock......... 70 00

BALUSTRADE RAILING, No. 231 Pattern, for a Stoop. Balusters 7 inches diameter, as shown on Illustrated Sheet, Straight, (not circled). PRICE.

Per foot, not put up......... ....$10 50
" put up at Building............ 12 00
Posts, each, as shown.................... 16 00

Same Railing for Court Yard, straight, (not circled).

Per foot, not put up 8 50
" put up in New York City....... 9 75

Gates, extra.

IRON GATE, as shown, No. 231 Pattern. PRICE.

Each, with Lock.......................$95 00

No. 232 Pattern of Railing, for a Stoop that requires a Straight (not circled) Railing. PRICE.

Per ft., exclusive of Newel Post, not put up, $5 00
" put up at Building in N. Y. City... 6 00
Newel Post, each...................... 7 00

The same Railing, Straight, used for a Court Yard, but has a Bottom Rail.

Per foot, not put up at Building, exclusive of Newels........................ 4 20
Per foot, put up at building in N. Y. City, 4 80

Gates, extra.

No. 232 Pattern of Railing, made Single Face, for a Court Yard.

Per ft.................................. 3 50
" put up at Building in New York City, 4 10

Gates, extra.

GATE under Stoop, No. 232 Pattern only.

Same size as shown, with Lock.......... 47 00

If made larger, additional.

IRON FRONTS, ROOFS, FIRE-PROOF CEILINGS, FLOORS AND PARTITIONS.

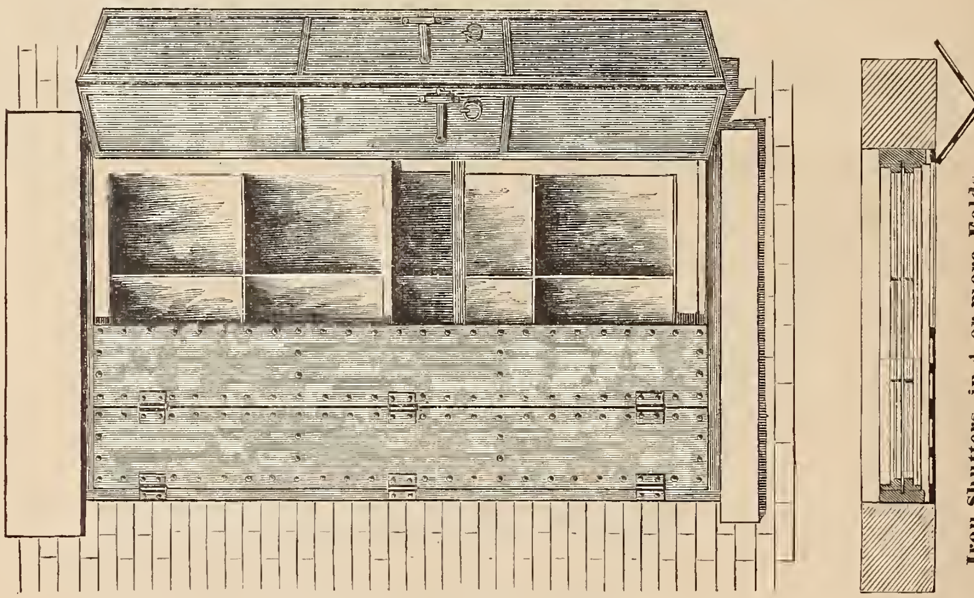
Patent Illuminating Tiles, for Side-Walks, Areas, Floors and Roofs.

Iron Doors & Sashes; Iron Vaults & Doors, for Banking Houses.

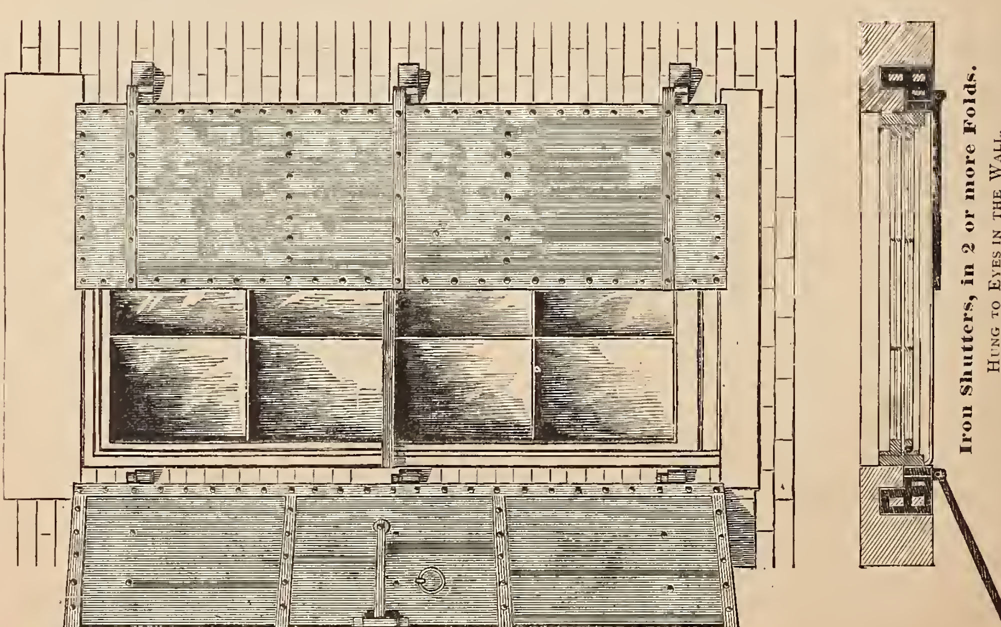
PATENT SKY-LIGHTS; Also, ORDINARY FLOOR AND SKY-LIGHTS.

Elevators for Stores, Stable Fixtures and Fittings, Iron Gratings, &c.

Prices will be given on application, mentioning particulars.

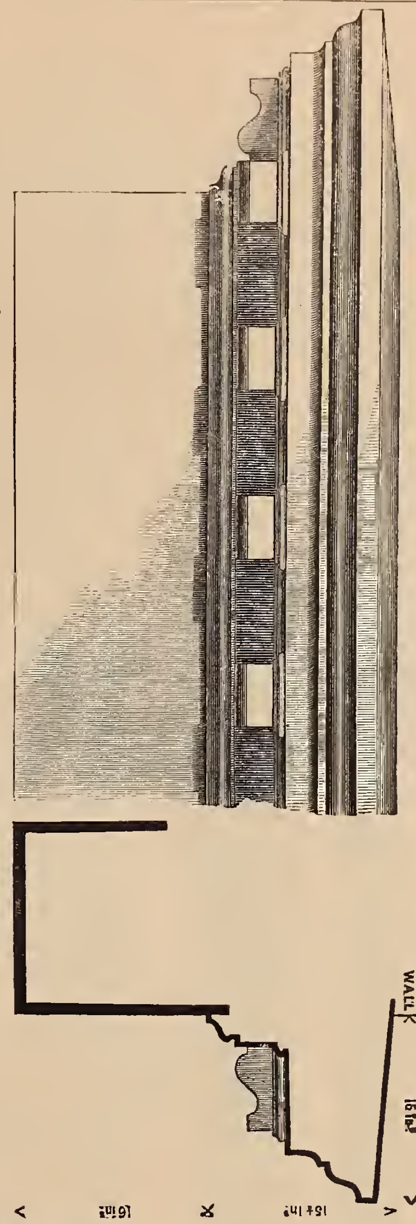


Iron Shutters, in 4 or more Folds.
Hung to Iron Frames.

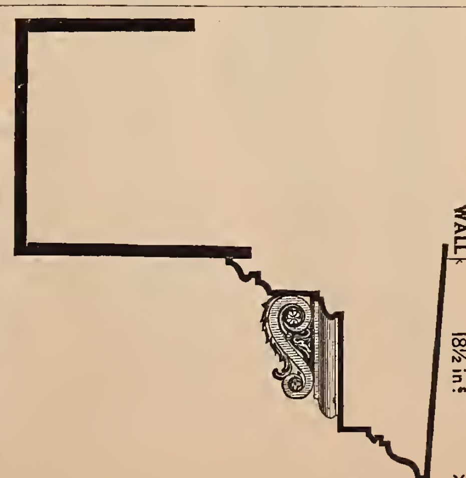


Iron Shutters, in 2 or more Folds.
Hung to Eyes in the Wall.

PARTICULAR ATTENTION GIVEN TO THE CONSTRUCTION OF FIRE-PROOF BUILDINGS.

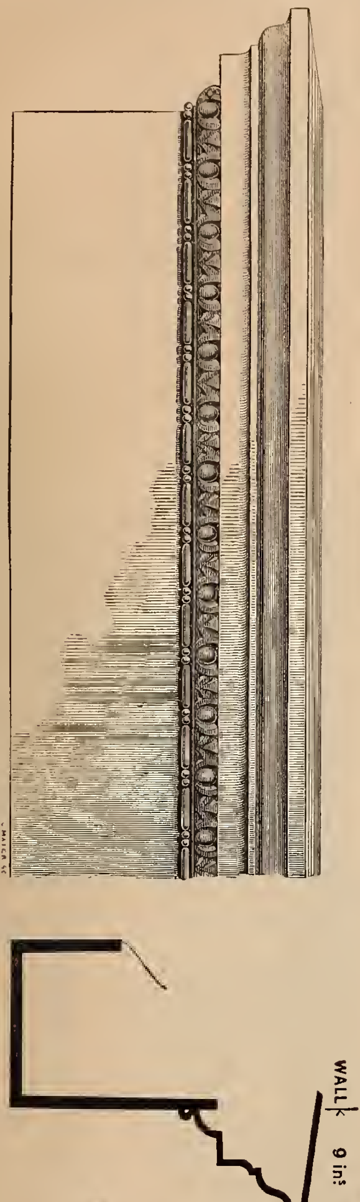


No. 8 PATTERN LINTEL AND CORNICE.

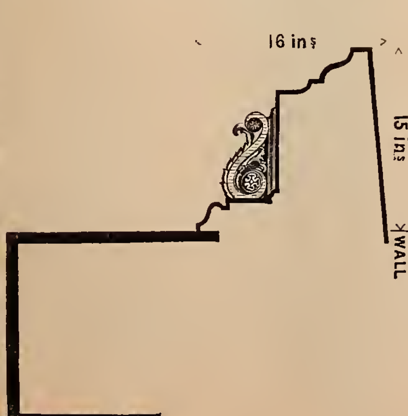


Section of No. 3 Pattern of Lintel & Cornice.

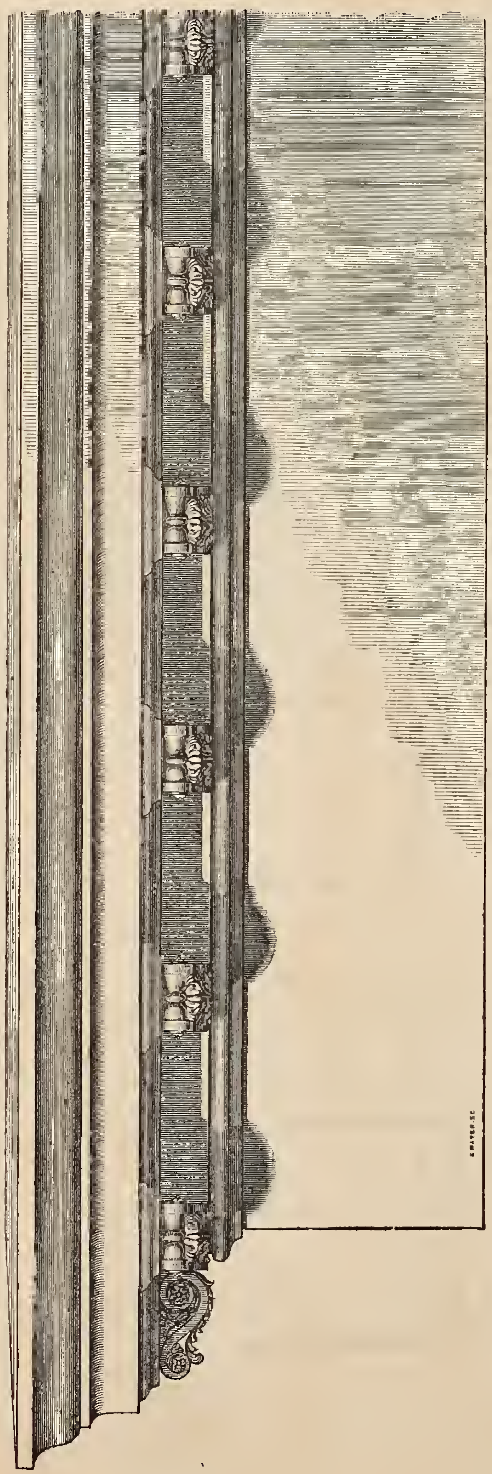
THE PRICES PER FOOT OF THE VARIOUS LINTELS AND CORNICE COURSES WILL BE GIVEN ON APPLICATION, BUT THE THICKNESS OF WALL MUST BE MENTIONED.



No. 2 PATTERN LINTEL AND CORNICE.

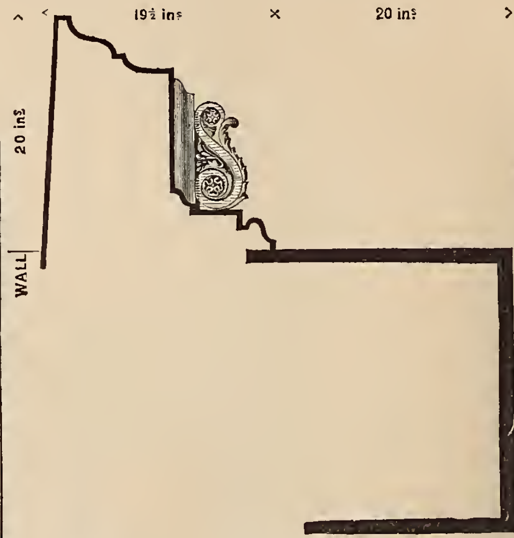


Section of No. 5 Pattern of Lintel & Cornice.

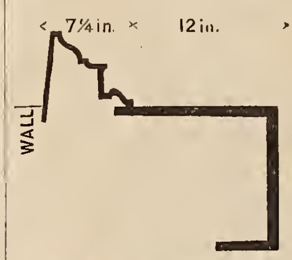


No. 4 PATTERN LINTEL AND CORNICE.

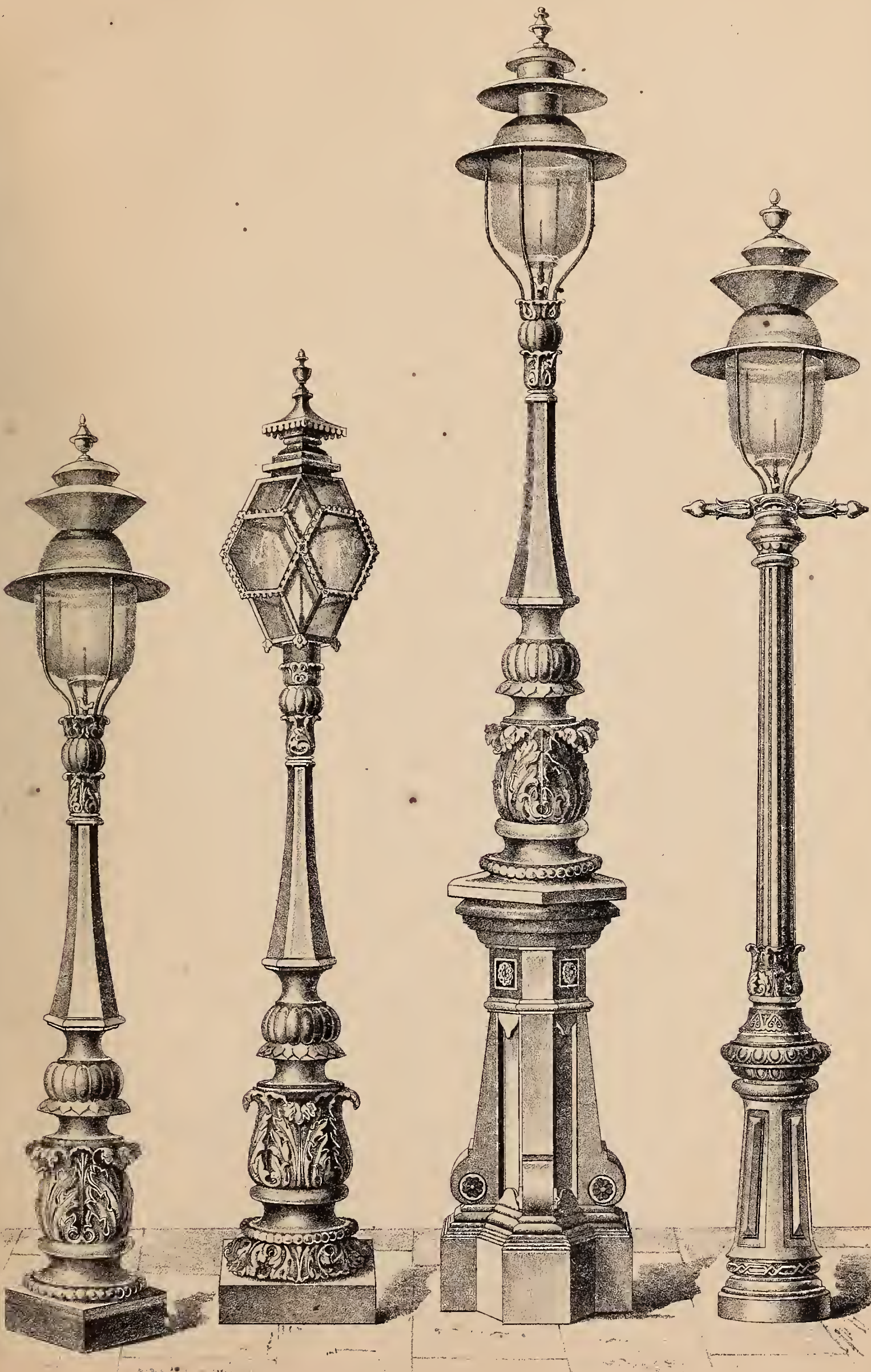
SEE SECTION TO THE RIGHT.



Section of No. 4 Lintel and Cornice.

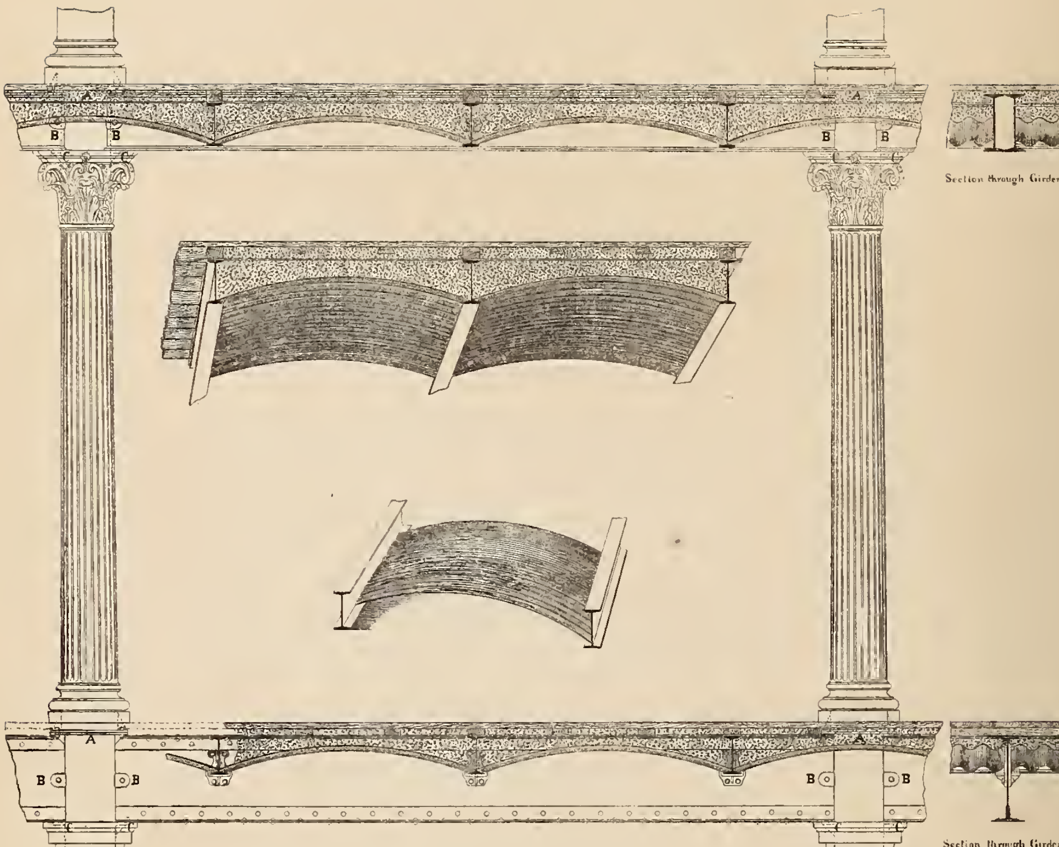


No. 0 PATTERN LINTEL AND CORNICE.



Design patented.

No. 121 No. 122 No. 123 No. 124

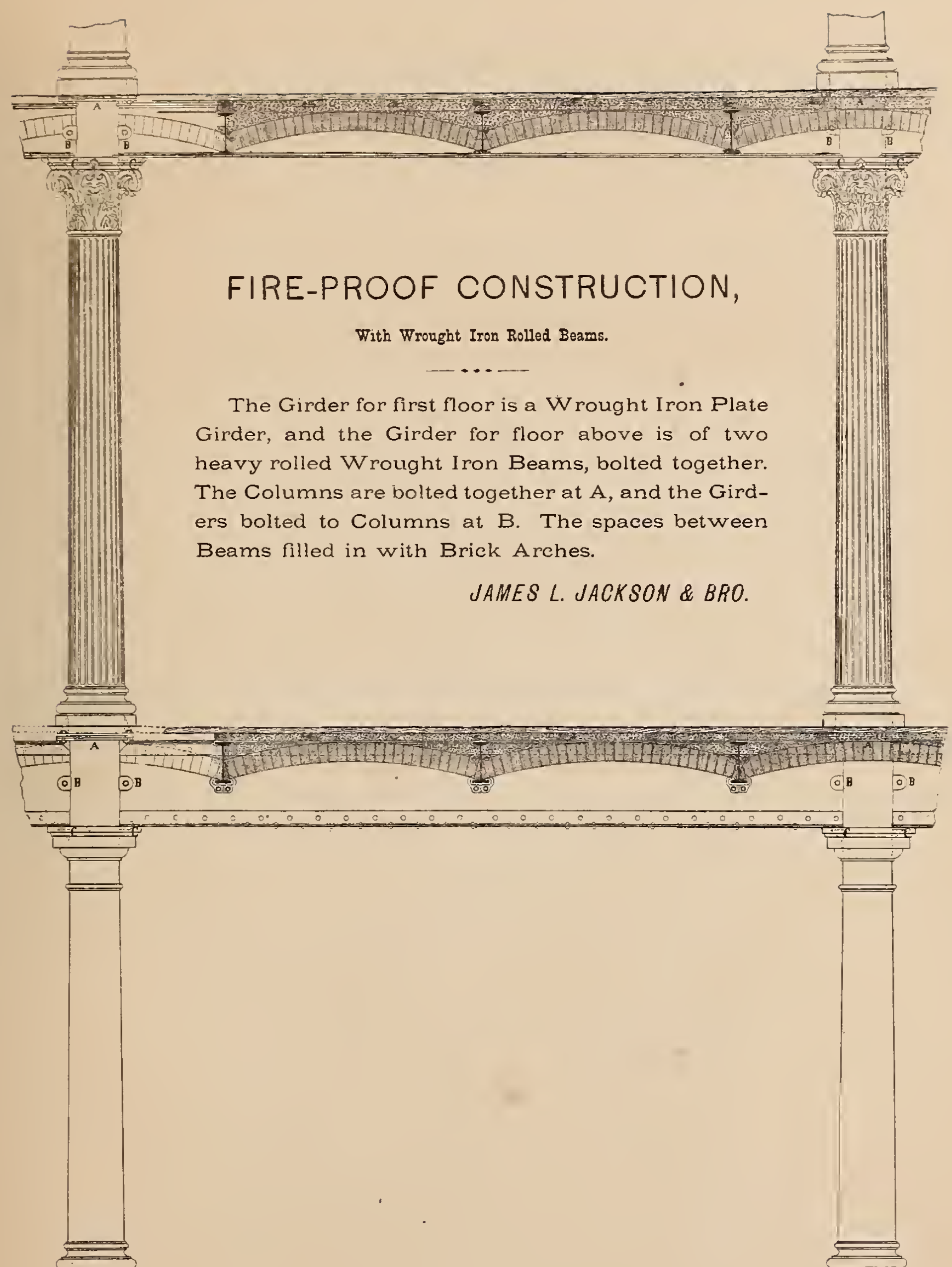


FIRE-PROOF CONSTRUCTION.

Showing Corrugated Iron Ceiling Arches resting on Wrought Iron Beams and Girders. The Columns bolted to each other at A, and the Girders bolted to Columns at B. Concrete filling on Arches. Wood Strips laid in Concrete to nail floor to.

JAMES L. JACKSON & BRO.

AM. PHOTO-LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS.)



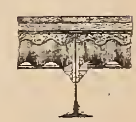
FIRE-PROOF CONSTRUCTION,

With Wrought Iron Rolled Beams.

The Girder for first floor is a Wrought Iron Plate Girder, and the Girder for floor above is of two heavy rolled Wrought Iron Beams, bolted together. The Columns are bolted together at A, and the Girders bolted to Columns at B. The spaces between Beams filled in with Brick Arches.

JAMES L. JACKSON & BRO.

Section through Girde



Section through Girder

AM. PHOTO-LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS.)

FIRE-PROOF CONSTRUCTION.

New York, May 17th, 1873.

The most efficient mode, without excessive cost and inconvenient restrictions in the plan of a building, is the great desideratum in the construction of a fire-proof building. The attention of the community, since the conflagrations in Chicago and Boston, has been awakened to the importance of providing the most effective construction to prevent not only the progress of fire from without, but also the combustion of merchandise within the building. The length of time that a fire-proof building will resist the action of intense heat depends, not only on the fire resisting material of which the building is composed, but also in the exercise of proper judgment in its construction, so that the best disposition may be made in the use of the materials of the different parts of the building, as well as that, when the materials are subject to a high temperature and expand, the parts of the building may not be thrown down by the expansion.

Another point of importance in the construction of a fire-proof building is to properly compute the strength of the materials when in their diminished capacity, subject to so many degrees of heat for a length of time that, in their diminution, these materials *are* still of ample strength to bear with safety the load imposed.

A fire-proof building must necessarily be an expensive structure, but we may manage with economy to get the best results from the materials and the mode of construction to be within the limit of a certain preseribed amount of expenditure. The first and most important parts of a building to resist fire are the walls, as they have to withstand the passage of heat both from inside and outside, and for them to maintain their erect position when subject to intense heat on the one side, is a matter of the greatest importance. Of building materials—brick and cement are among the best resistants to the passage of heat.

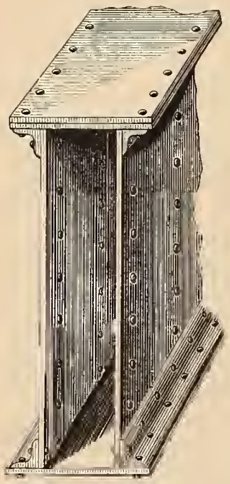
The following are placed in their order of resistance to the passage of heat—slate being taken at a unit, and lead being last as the best conductor :

Plaster and Sand,	19
Plaster of Paris,	20
Roman Cement,	21
Common Brick,	60
Fire-Brick,	62
Granite,	75
Slate,	100
Lead,	521

Brick will resist fusion at the same temperature at which Granite, Marble and other Stones will crumble to pieces.

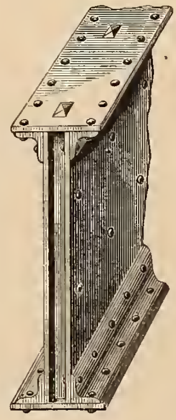
In order that the walls may be of the greatest strength, and may resist the passage of heat, they should be in one continuous *bond*, uninterrupted by recesses for beams, and every beam should be anchored to the wall in order that it may be held in its vertical position when expanded on the one side by the action of heat.

Read the article on faulty construction on page 60.

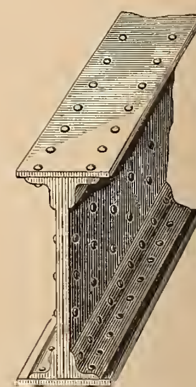


12 inches.

24 inches.

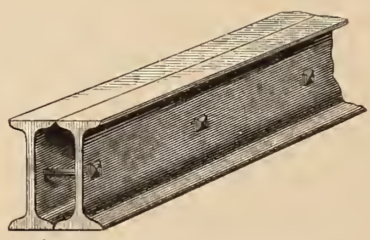


8 inches.



8 inches.

9 inches.



8 in. Girder formed of 2 Rolled Beams.

If Wrought Iron Beams and Girders, as well as Columns, are in exposed positions, and are likely to be surrounded by combustible merchandise, it is proper that due allowance should be made for their diminished strength to sustain the loads imposed, when subject to a certain degree of heat. It is economy in some cases to cover them with a fire resisting material.

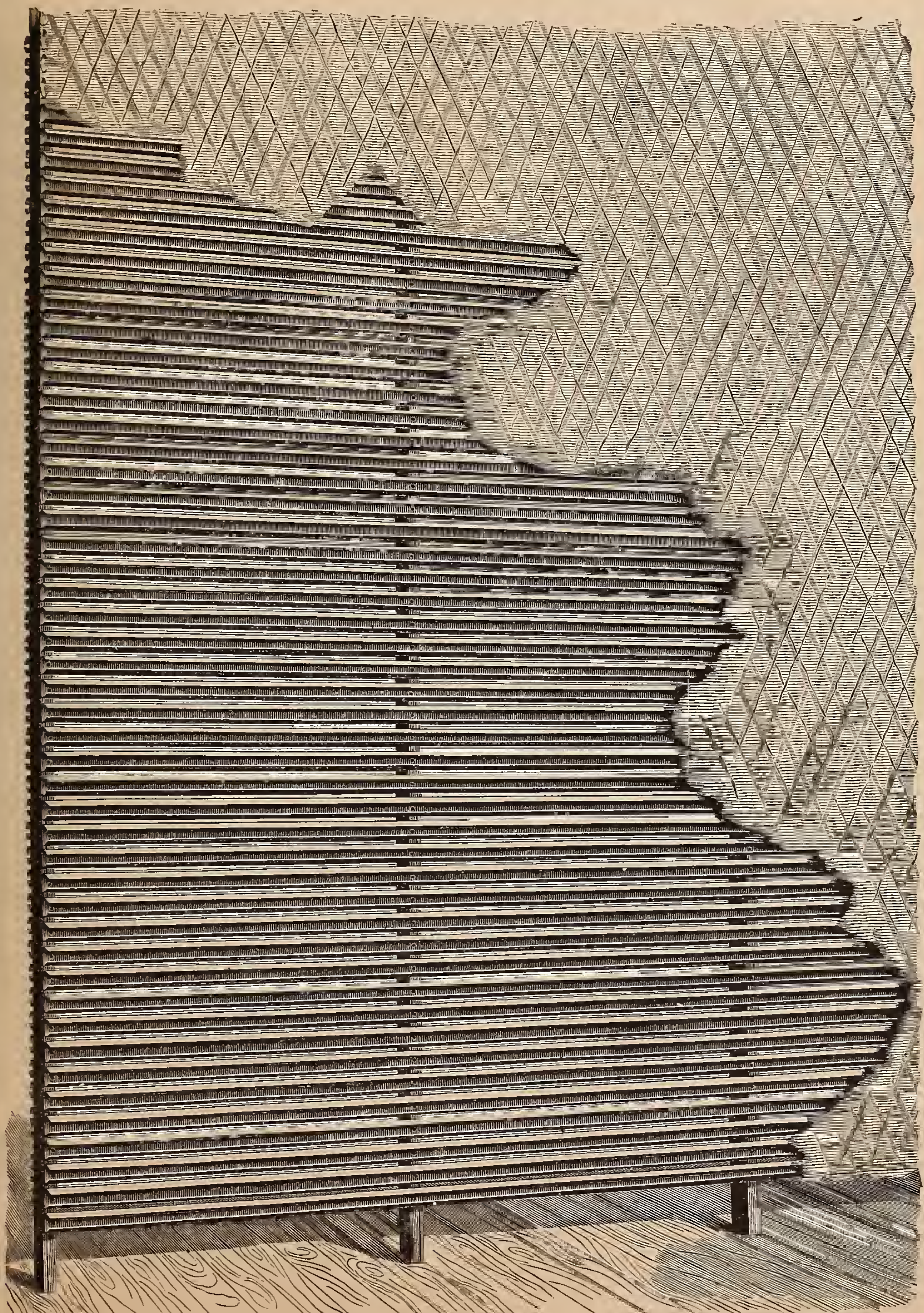
All Tension Rods should be either built in brick-work or substantially imbedded in Plaster of Paris, or other fire resisting material, as their exposure to heat elongates them and *releases* the abutments of the Arch.

Inside Iron Partitions, covered with Plaster of Paris on both sides, are an excellent resistant to the passage of fire.

For Safe Deposit Company's Vaults, where expense is not of primary consideration, Fire-Brick is the best material, as it resists fusion at an intense heat, and for a great length of time, and is a dull conductor of heat.

IRON PARTITIONS,

FOR FIRE-PROOF BUILDINGS.



IMPROVEMENT

IN THE PRESENT

Faulty Construction of Buildings.

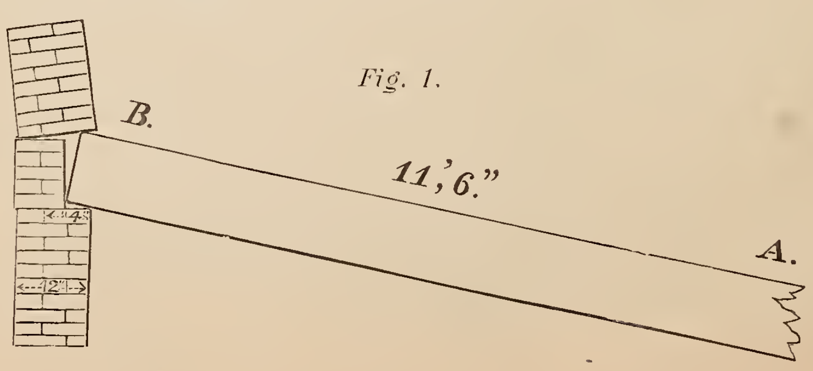
The serious destruction of property by fire, demonstrates the importance of any improvement by which greater security, in the construction of buildings, can be obtained without too much cost. The walls of a building should not only serve as an enclosure, but, as far as possible, should, by remaining erect during a conflagration, serve as an impenetrable barrier to prevent not only the extension of fire, but also the transmission of heat.

Could the walls have retained their vertical position during the great conflagrations in Chicago and Boston, it is evident that the progress of the fire, in certain directions, would have been stayed, and the damage have been much less.

The walls of buildings now erected, in different cities of the Union (with the exception of Boston and Chicago, where they are corbelled out to receive the beams), are built up with the beams laying and resting on them to the depth of from four to six inches; and when, in case of fire, the beams have so far burned away as to be no longer of sufficient capacity to support the load on the floor, the beams break, and each one acts as a powerful lever to break the bond of the wall on a line with the top of the beams, and the anchored beams in most instances carry the wall with them in their downward flight.

As an instance, in a building 25 feet wide, with a wall on each side 12 inches in thickness (the distance between the walls thus being 23 feet), let the beams, as usual, rest 4 inches on each wall. Now, if the beam is broken in the middle, which is 11 feet 6 inches from the wall, the leverage exerted at the point of fracture to break the bond of the wall is 34½ times the leverage exerted to break the bond on the top line of the beam; or one ton weight at the place of fracture of beam at A [see figure 1] exerts 34½ tons to break the bond of the wall at B. This leverage is exerted by all the beams, which are usually from 12 to 16 inches apart, to the full depth of the building, and the anchored beams, on which the anchors are usually well secured and built in the walls, take the walls with them in their downward flight.

Fig. 1.

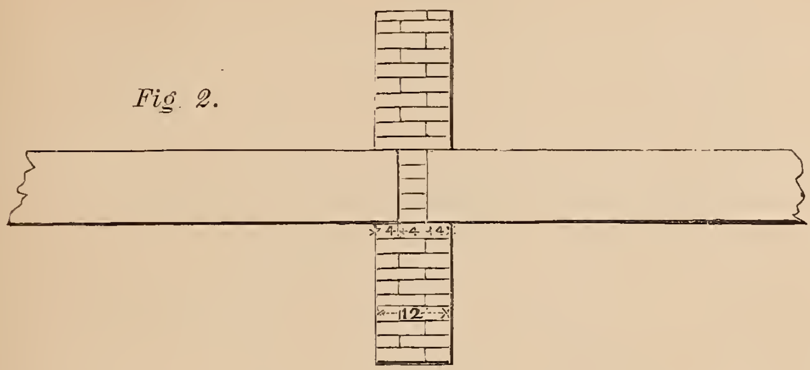


See figure 4, on page 63, the improved mode, in comparison with the above.

The fact of wood being soft, and the brick work at ends of beams chipping off, and the anchors tearing away from the beams, lessens the effect of this irresistible force, which accounts for some walls standing *after the beams* have fallen. Efforts have been made to obviate the effect of this leverage, by cutting off the ends of beams on a bevel, but this really is of no avail, as the beveled end is filled up with mortar in order that the brick work directly over it may have a proper bed. This mortar becoming in time as hard as the brick, the effect, in case of fracture, is much the same as if the ends of beams were at right angles with the length. The brick work between the beams cannot be laid up in bond, like the other parts of the wall which are not interrupted by beams, but is laid up in part with broken brick to fill up the spaces, and not with close joints. The wall, also, at the place where the beams are inserted, is weaker than it is at any other part, as the beams have no adhering property for the brick and mortar.

When the beams are inserted 4 inches on each side of a 12 inch party wall, there is only a space of 4 inches between the ends of the beams, to prevent the transmission of heat from the beams, when on fire on the one side, to those on the other. See figure 2.

Fig. 2.



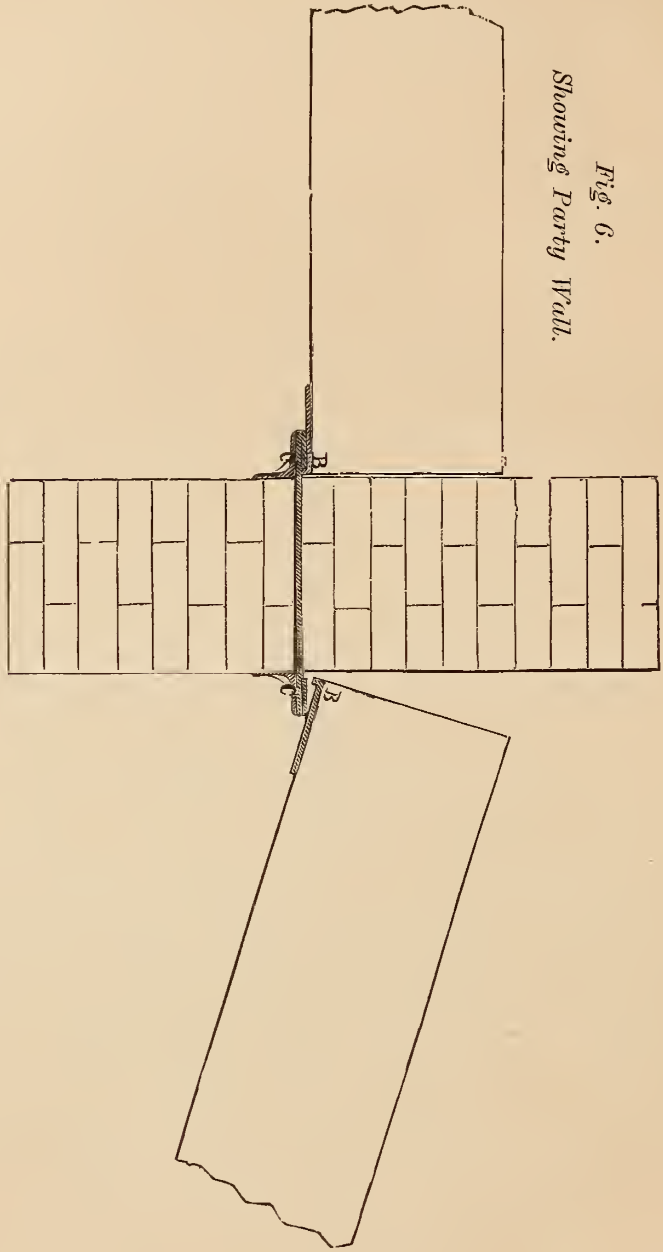
See figure 6, on page 62, the improved mode, in comparison with the above.

The parties in interest in the patent Beam adjuster respectfully solicit the attention of the public, believing that the Adjuster will obviate the defects heretofore mentioned.

The primary object is to have the walls in one continuous bond from the foundation to the top of the building, without either recesses or projections for the support of the beams. Such walls will be much stronger, and will be able to sustain for a longer time the intense heat of a conflagration, and, in consequence of their unvarying thickness, will be more capable of resisting the transmission of heat to the inside of the building.

Also, should fire take place within the building, when the beams have so far burned away that they are no longer of sufficient capacity to sustain the floors and the imposed loads, fracture takes place, and at once all the beams are let loose from the walls, which are left in their vertical position. See figure 6.

Fig. 6.
Showing Party Wall.



In order to keep a wall in its vertical position, it is of importance to have every beam firmly secured to the wall by these hold-fasts, instead of the ordinary anchors, which are built in the wall once in every 6 to 10 feet.

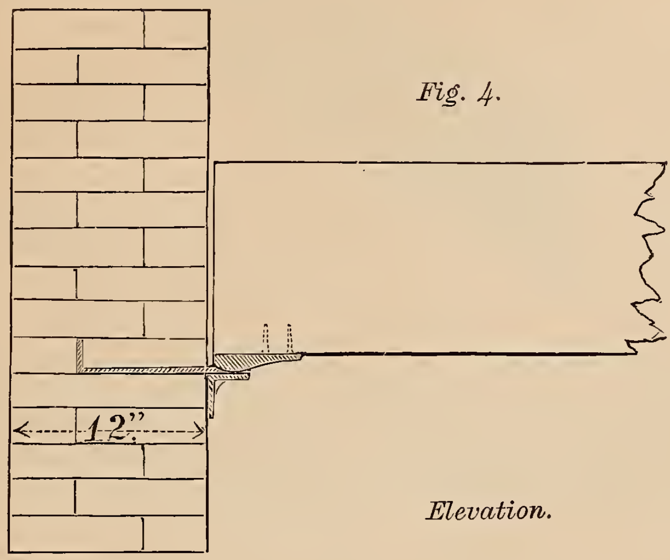
When a brick wall on the one side is attacked by great heat it expands according to the increased temperature, and forms a curvature on the side exposed to the heat (which will be elongated); each beam being secured to the wall on the other side, will cause it to retain its vertical position much better than if it were anchored in the ordinary manner. When the beams do not enter the walls it is impossible for them to be carelessly inserted in or near a flue, which is the cause of many fires.

Brick is one of the best resistants to the transmission of heat of building materials.

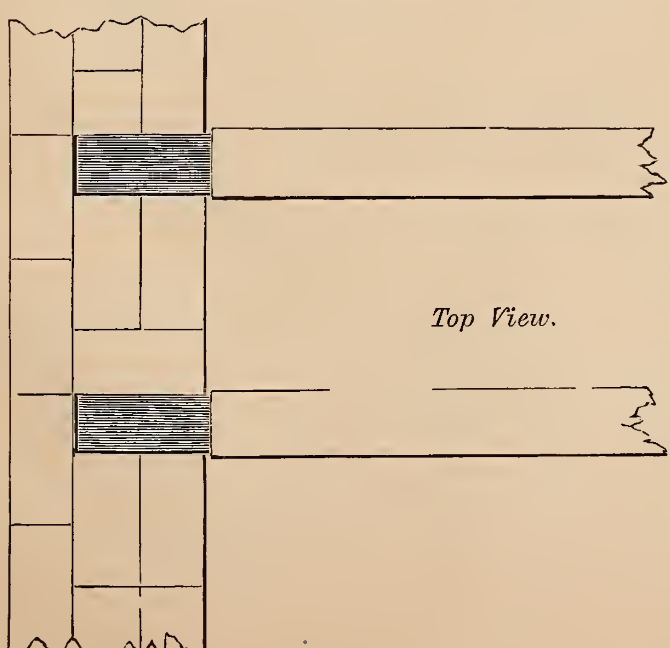
These Beam Adjusters, patented March, 1873, are made of wrought-iron, or can be made of cast-iron.

The above [see figure 6] represents them made of wrought-iron. The beams have at the ends on the bottom, at B, an iron plate with a projection at the end, which sets in and rests on the recess in the wrought-iron piece which is built in the wall. These projections are usually 3 inches out from the wall, and the beam being shod with iron on its bottom bearing surface, transmits the bearing surface of the wood to about 5 inches. When the beam has deflected sufficiently to fracture it, the end of the iron plate B is lifted from the recess in the projection C, sufficiently to be entirely free from the wall, and the beam is at liberty to pursue its downward flight.

Fig. 4.

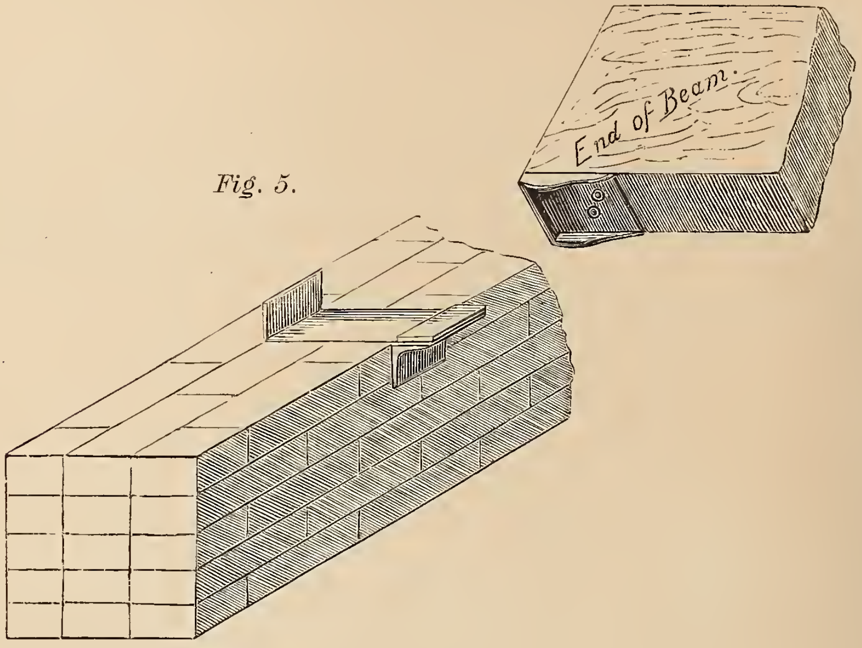


Elevation.



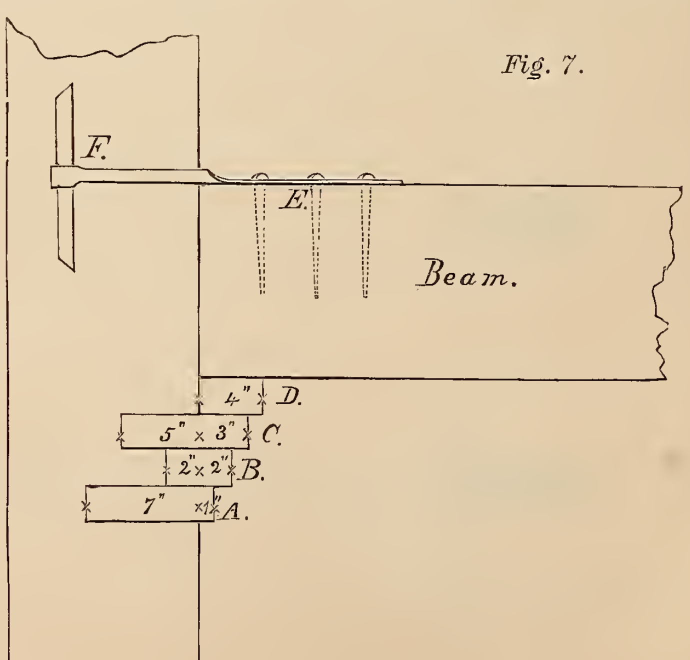
Top View.

Fig. 5.



Since the great conflagrations in Chicago and Boston, in order to prevent this faulty method of building—the beams into the walls—the Building Laws have been so amended as to require the walls to be corbelled out to receive the beams. This was practiced in the City of New York, and was found to be objectionable, as the bond of the wall at the place of the corbelling was found to be weakened by the following causes—see figure 7.

Fig. 7.



A is the brick laid as a header, 7 inches in wall and 1 inch outside.

B is the brick laid as a stretcher, 2 inches in wall and 2 inches outside.

C is the brick laid as a header, 5 inches in wall and 3 inches outside.

D is the brick laid as a stretcher, 0 inches in wall and 4 inches outside.

The top brick D has no bond on the wall, and there is only the strength of the three bricks A, B, C, to sustain the weight of the floor-beam, and cases have occurred where the bricks have broken off. Besides, the wall is made very weak by this mode of corbelling, as the brick work, at what ought to be the essentially strong point, is very weak from the irregular filling in behind the corbelling. In addition, the anchors are securely fastened to the beams on one end at E, and built in the walls at F; and when the beams break, these anchors have either to tear loose from them or to take the wall with them. Also the mode of corbelling makes a bad finish on the inside of the wall.

C. VOELCKERS, Boston,
S. SWETT, Boston,
J. L. JACKSON & BROTHER, New York,
Owners of Patent.

JAS. L. JACKSON & BRO., Iron Works,
East 28th St., 2d Ave. and East 29th St.

Office, 315 East 28th St., New York,

IRON ROOFS.

FIRE-PROOF FLOORS AND CEILINGS.

Iron Stairs, Bank Vaults,

AND

VAULT DOORS FOR BANKING HOUSES.

Iron Sidewalks forming Vault Extension.

IRON GIRDERS & BEAMS.

Patent Vault Lights. Patent Skylights.

ORDINARY SKYLIGHTS AND FLOOR LIGHTS.

Iron Window Sashes and Frames.

TRUSS PLATES AND BOLTS,

FOR WOOD BEAMS.

Anchors, Bridle Irons, &c.

LAMP POSTS AND LANTERNS.

WINDOW SILLS AND WINDOW GUARDS.

Wrought Iron Railings.

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BEAMS, GIRDERS, COLUMNS.